DIESEL POWER

AND DIESEL TRANSPORTATION

MAY, 1952

- ***Protecting Idlewild from Fire***
- ***Some Factors in Picking Mufflers***

★ Operating records from all parts of the country show *truly low* fuel consumption for Diesel, gas and dual-fuel engines lubricated with *Texaco Ursa Oil*. And *truly low* maintenance costs, too.

Texaco Ursa Oil's "built in" resistance to oxidation and ability to stand up under extreme heat and pressure keep engines running clean. Rings stay free, ports stay clear, valves work properly — unhampered by harmful formations of carbon, sludge and gum. Results: better compression and combustion for lower fuel consumption; less wear and smoother operation for lower maintenance costs.

Leading engine builders approve *Texaco Ursa Oils*, and there is a complete line to assure top performance from every type and size of Diesel engine. That's why—

For over 15 years, more stationary Diesel h.p. in the U.S. has been lubricated with Texaco Ursa Oil than with any other brand.

You'll find it worth your while to talk to a Texaco Lubrication Engineer. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

☆ ☆ ☆

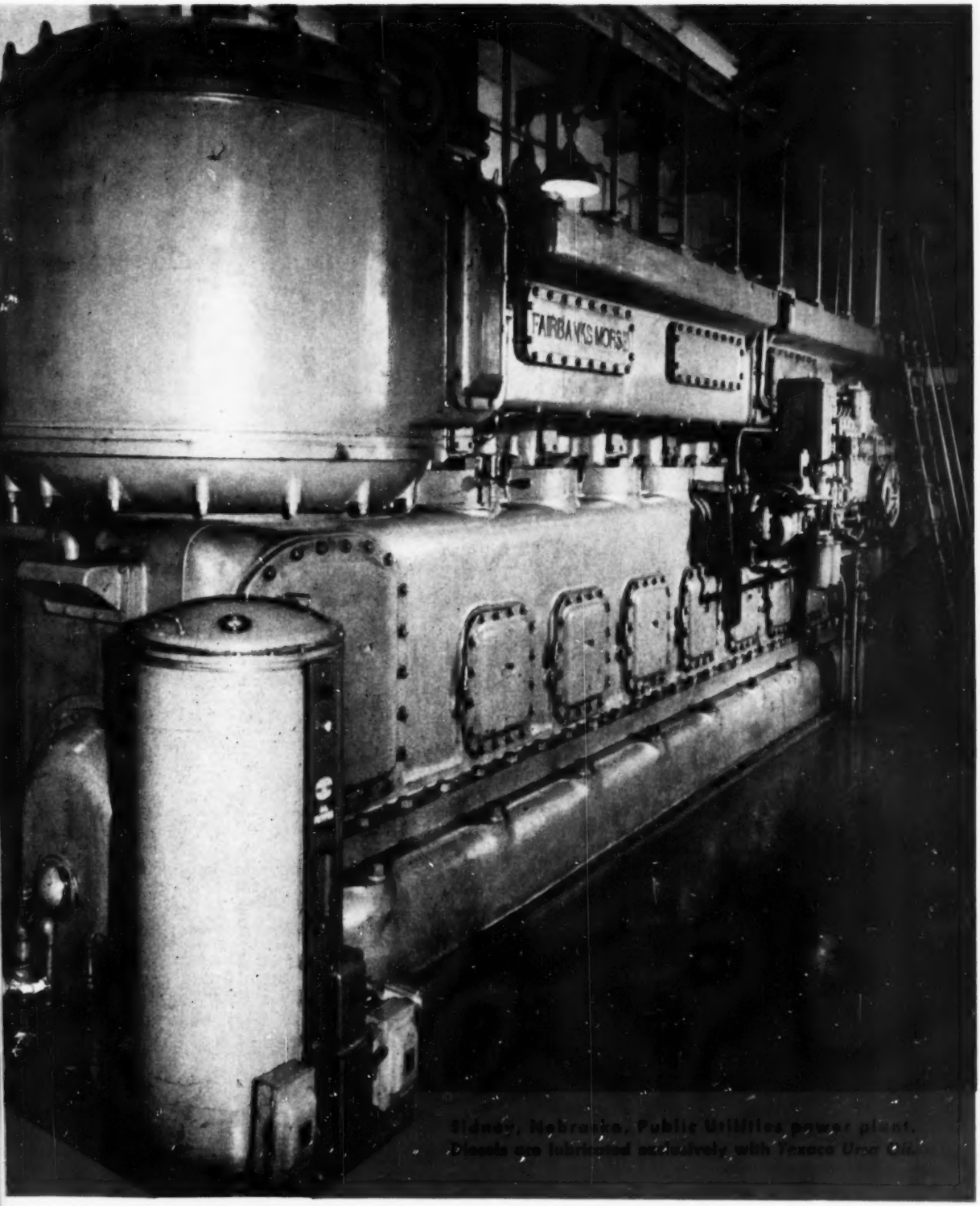
The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TUNE IN . . . TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. See newspaper for time and station.

TEXACO

TEXACO

DIESEL POWER and DIESEL TRANSPORTATION for May 1952, Vol. XXX, No. 5. It is published monthly by Diesel Publications, Inc., Orange, Conn. Executive and Editorial offices at 192 Lexington Ave., New York 16, N. Y. Subscription rates: United States, $3.00 per year, single copies 35¢; Canada $4.00. Foreign $5.00 per year. Entered as second class matter April 29, 1949 at the Post Office, Orange, Connecticut under Act of March 3, 1879.



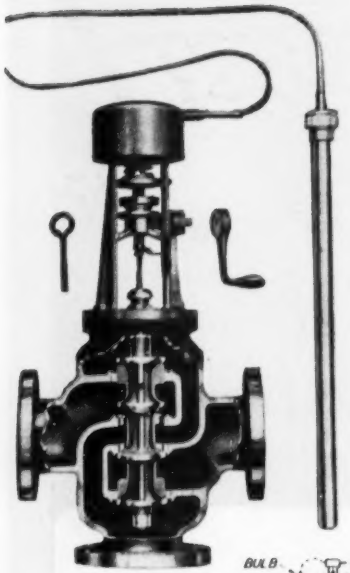
Sidney, Nebraska, Public Utilities power plant. Diesels are lubricated exclusively with Texaco Ursa Oil.

URSA OILS FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES

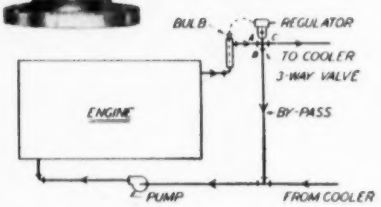
Faithfully yours
TEXACO
50
for Fifty Years

AUTOMATIC TROUBLE-STOPPERS FOR ENGINES!

Sylphon Controls protect against bearing, piston, cylinder and other damage

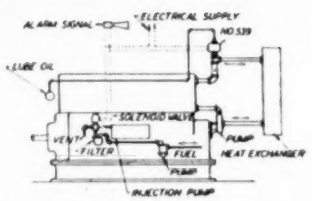


No. 923-3WB



CONTROLS TEMPERATURE. *Equipped with a 3-way valve which is automatically positioned to direct all or part of the water through a by-pass. No. 923-3WB maintains constant volume of water through pump and engine . . . gives quick warm-up . . . improves performance.*

No. 539



SOUNDS ALARM. *If water jacket temperature goes above, or lube oil pressure goes below the safe point, No. 539 sounds an alarm, flashes a warning signal or, if desired, shuts down engine operation. Fail-safe type. Rugged, reliable, compact—built for long, faithful service.*

● With Sylphon Controls, you can be sure that jacket water temperature and lube oil pressure will be safeguarded at all times. They protect engines against over-heating or low pressure troubles . . . improve lubrication . . . reduce fuel and oil consumption . . . minimize corrosion. Pay for themselves many times over in warding off costly shut-downs, damage or repairs.

The two Sylphon Controls pictured are typical of the line—a line made by specialists in this field for years. Send for information about them, or about other Sylphon Regulators to meet your specific temperature or pressure control requirements. Ask for Bulletin JD-817.

Temperature Controls • Bellows Devices • Bellows Assemblies

FULTON SYLPHON
DIVISION

FIRST WITH BELLOWS

ROBERTSHAW-FULTON CONTROLS CO., KNOXVILLE 4, TENN.

Canadian Representatives, Darling Brothers, Montreal

Again... proved BEST!

Over-all engine wear REDUCED.... 78%
Ring wear REDUCED..... 33%
in over-the-road tests with

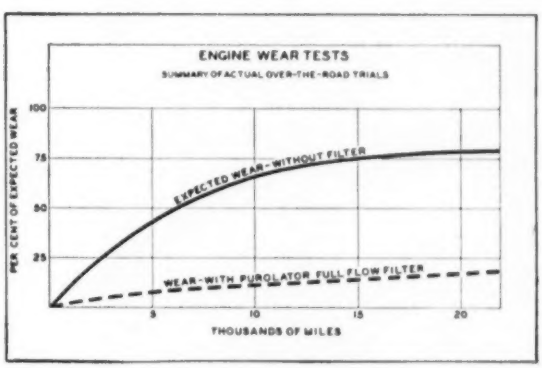
PUROLATOR

FULL-FLOW

MICRONIC FILTERS

In test after test, America's leading automotive and engine manufacturers are proving that Purolator oil filters are the best!

The figures you see above are from engineering records compiled by one of the world's largest makers of passenger cars and trucks. They are the results of gruelling *actual-service* tests made to compare the performance of various makes and types of lube oil filters. And, like so many other important ones, this manufacturer found that Purolator*, *and only Purolator*, oil filters gave them the engine-saving performance they were seeking. They found that Purolator Full-Flow filtration was better by far than *any* partial flow system . . . that the Purolator Micronic* Filter element gave finer filtration, with longer life, at lower pressures than any other tested.

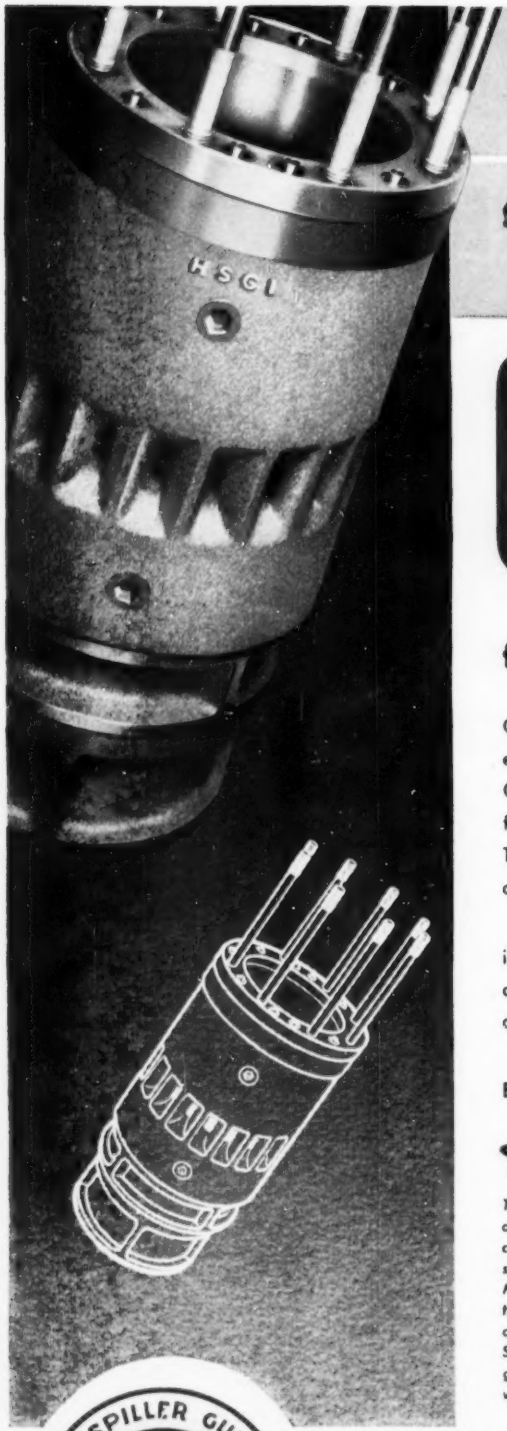


There are sound reasons for the Purolator Micronic Filter Element's outstanding superiority! It is the *only* element capable of delivering full-flow rates during its entire service life, *with dependable filtration down to submicrons* (.0000039 in.)! It has *ten times* the effective filtering area of old-style filters.

If you are a maker or user of internal combustion engines, you are invited to test and *compare* Purolator performance for yourself. Our Engineering Department will gladly co-operate in helping you prove to your own satisfaction *that there is no other oil filter capable of giving you better engine protection than Purolator. Simply write, telling us what equipment you are using.* *Reg. U. S. Pat. Off.

PUROLATOR PRODUCTS, INC.
Rahway, New Jersey and Toronto, Ontario, Canada
Factory Branch Offices:
Chicago, Detroit, Los Angeles

PUROLATOR
MICRONIC OIL FILTER
"FIRST IN THE FIELD OF FILTERING"



GUN IRON

HUNT-SPILLER

...THE MODERN METAL for Diesel Engine Wearing Parts

Gun Iron castings, identified by the letters "HSGI", spell long, economical service for diesel engine wearing parts. Hunt-Spiller Gun Iron contains properties which provide unusual resistance to friction—extreme pressure—high heat—corrosion and erosion. These properties are recognized as vital for economical operation of diesel engine wearing parts.

The quality of Gun Iron is at all times completely controlled. It is produced in our own air furnaces, cast in our modern foundry and, when desired, the castings can be completely machined in our manufacturing plant.

Look for the letters "HSGI"—Hunt-Spiller Gun Iron—for Diesel Engine Wearing Parts.

The Civil War

The term Gun Iron dates to the founding of this company in 1810. During the Civil War at the South Boston Iron Works (opposite) two 11 inch caliber Dahlgren guns were cast, for the revolving turret of the famous Union ship 'Monitor. It will be remembered that the Monitor and the Confederate ship Merrimac were the first ironclads to duel in the Civil War—changing the entire course of naval history. The South Boston works also made some 200 Rodman guns for the Union Army, more than half of which were of 15 inch caliber and weighed 25 tons apiece.

HUNT • SPILLER GUN IRON • AIR FURNACE PROCESS

HUNT • SPILLER

MANUFACTURING CORPORATION

378 DORCHESTER AVENUE • SOUTH BOSTON 27, MASS.

Canadian Representatives: Joseph Robb & Co., Ltd., 4050 Namur St., Montreal 16, P. Q.

Where POWER FAILURE MAY MEAN DISASTER

SYNCHRO-START controlled Engine Generator-Sets will instantly provide a continuous flow of auxiliary power for the duration of the failure.

Within seconds after the main power fails, the **SYNCHRO-START CONTROLS** automatically bring in stand-by generator sets to provide emergency power. When the main service is restored, this same control stops the engine and resets itself for the next power demand.

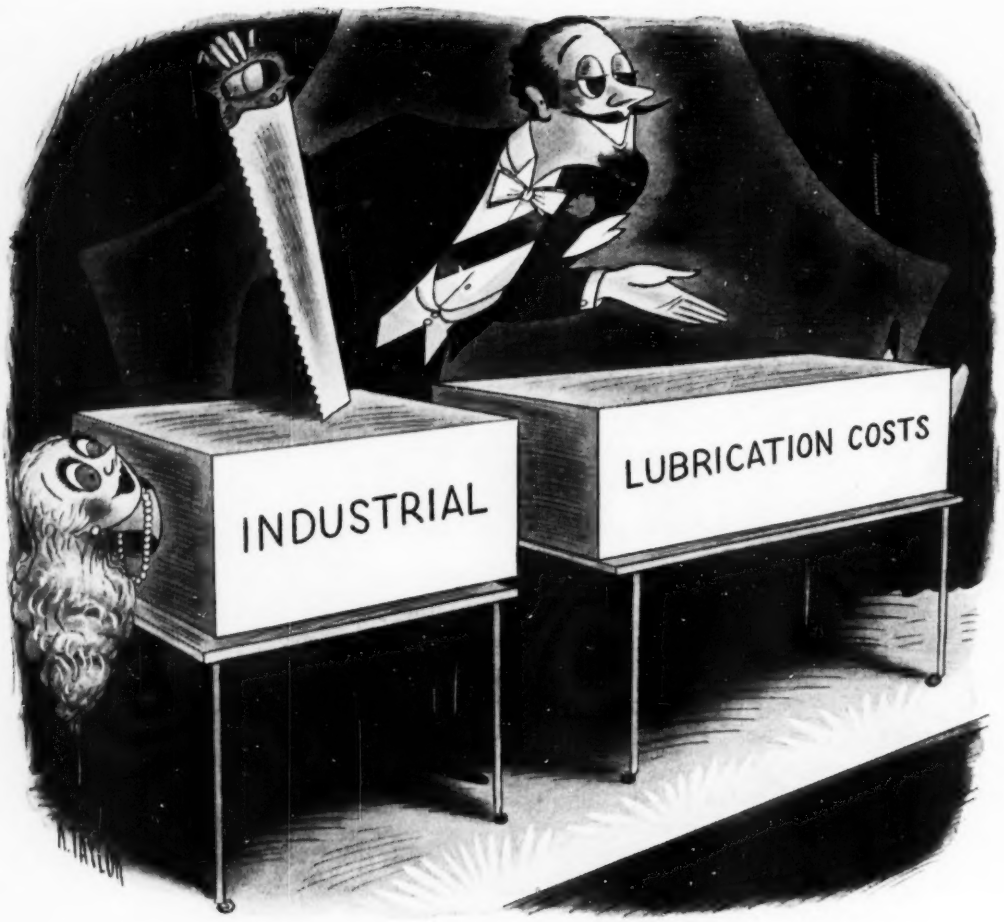
Besides automatically Starting and Stopping the engine, our Model 1436 control protects the engine against any abnormal conditions while running — such as, low oil pressure, overheating, fuel or ignition failure, over-speeding and over-cranking, in which case it will stop the engine and signal an operator with visual or audible alarms and indicating lights in the control to show the exact cause of the trouble, should it ever occur.

SYNCHRO-START AUTOMATIC CONTROLS can be furnished for any model and any number of internal combustion engines used for any power application. Their use throughout the world for the past 20 years has proven their dependability, safety and economy.

Ask your engine manufacturer, dealer, architect, engineering firm or write us for information and catalogue describing our full line of control products.

SYNCHRO-START PRODUCTS, INC.

8151 NORTH RIDGEWAY AVENUE, SKOKIE, ILLINOIS



Nice trick, and you can do it... with Pure Oil Industrial Lubricants

Many of the top-quality oils and greases in Pure Oil's complete line of industrial lubricants have been designed to do several *different* jobs, instead of one specific job.

And to do each job *equally well.*

This enables you to do *all* your lubricating with *fewer* lubricants. In other words, you can

simplify and save...with Pure Oil Industrial Lubricants

If you are interested in something that can definitely cut your costs (and who isn't, in times like these?), write: The Pure Oil Company, Industrial Sales, 35 E. Wacker Dr., Chicago 1, Illinois.

THE PURE OIL COMPANY, U.S.A. PURE

Be sure with Pure

One step.. no stop.. it's clean again

Strain your fluids with Cuno AUTO-KLEAN—the only strainer you can "comb clean" while it's working. Exclusive "comb-action" cleaning—*periodically* by hand . . . or *continuously* by automatic means. No need to stop flow. *Guaranteed* to remove 100% of all solids larger than specified.

CUNO

Fluid Conditioning

Removes More Sizes of Solids from More Kinds of Fluids

Strain fuels, lubricants, process fluids, etc.—AUTO-KLEAN
Filter fuels, lubricants, process fluids, etc.—MICRO-KLEAN
Clean raw water, recirculating water, etc.—FLO-KLEAN

Stop That Sludge

How can you *be sure* that sludge formed in lube oil won't *ever* damage bearings, crankshafts and cylinders?

Answer: A Cuno AUTO-KLEAN strains full flow—positively and continuously—removing the sludge.

Positively because its all-metal disc construction cannot possibly permit the passage of any solids larger than specified. And there's no chance of a hole or channel occurring to let harmful solids through.

Continuously because the AUTO-KLEAN is cleanable while working. You never have to stop the engine. A turn of a handle—manually or automatically—does the trick, and the lube supply doesn't even stop to notice what's happening.

Stops Dirt—for Sure

This way of keeping the strainer clean is the most fool-proof, too. It's not mere surface-scraping. The cleaner blades dig in and comb out the dirt, no matter how sticky, and with no danger of pushing it through to the discharge side.

Remember—the Cuno AUTO-KLEAN is *guaranteed* to remove all solids larger than specified.*

Cuno AUTO-KLEAN strainers are available for built-in or external installation. Continuously-cleanable feature permits single unit installation. Straight-line connections for simplicity of installation on either fuel or lube.

*Models available for straining from .0085 to .062 in.

Cuno Engineering Corporation
Dept. 256B, South Vine Street, Meriden, Conn.

Please send information on Cuno AUTO-KLEAN Strainers for Diesel Protection.

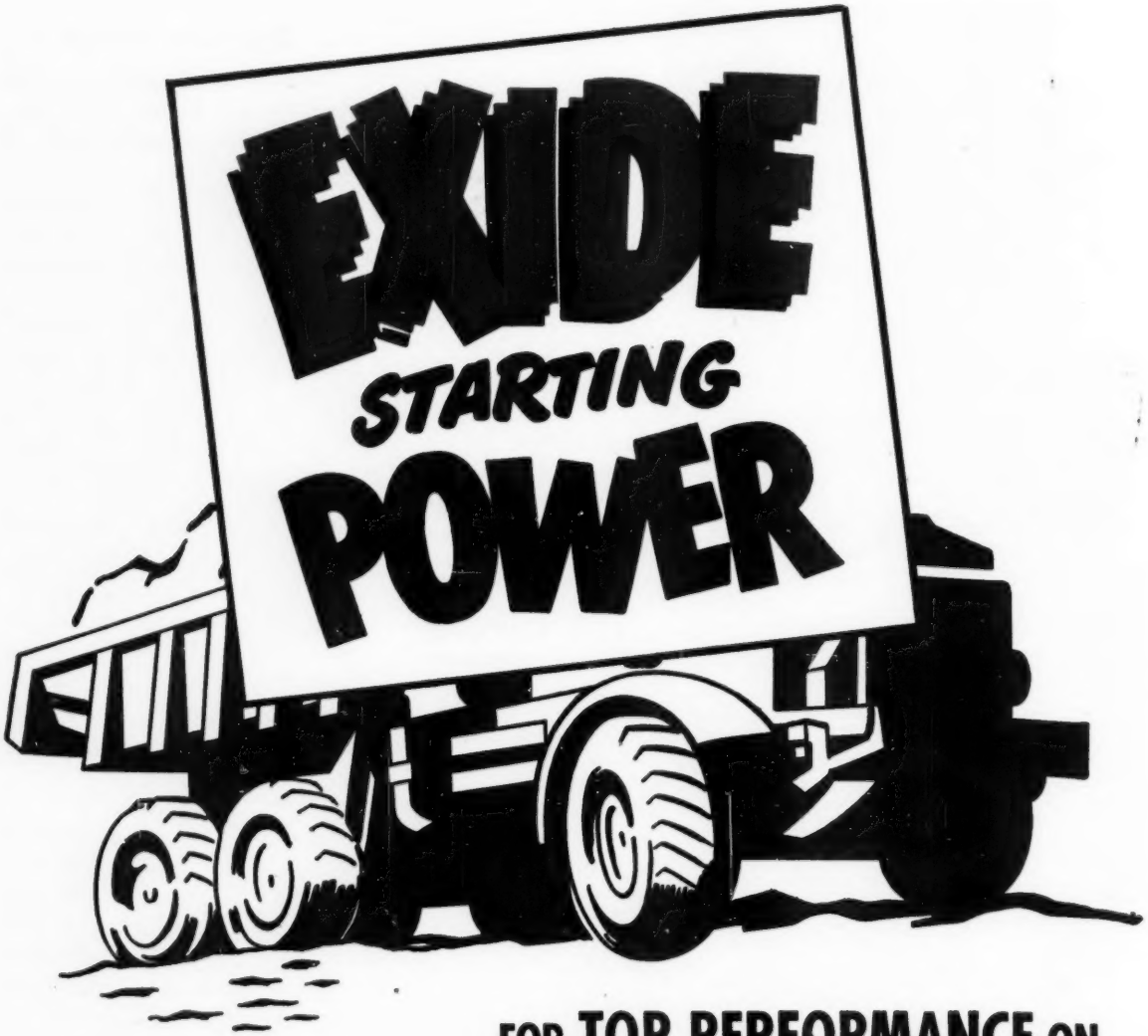
Name .....

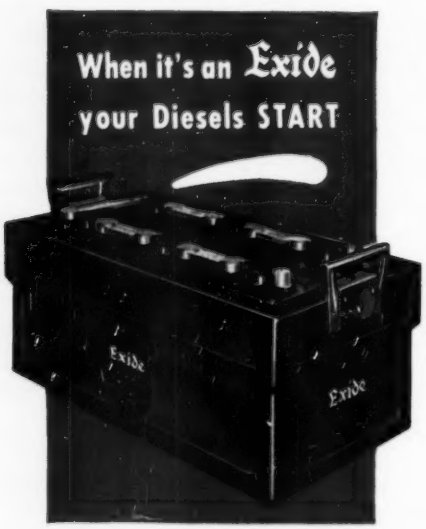
Company .....

Address .....

City ..... Zone .... State ....

Please attach to business letterhead





FOR TOP PERFORMANCE ON ALL DIESEL-STARTING JOBS

For STARTING DEPENDABILITY, choose Exide Batteries. They're built specifically for the job . . . built in types and capacities for ALL diesel-starting applications. Each is a development of years of exacting research and engineering to give you batteries that will withstand the rigors of all climates and hard, rugged service. In Exide Diesel-Starting Batteries you get:

QUICK BREAKAWAY and fast acceleration of engine to firing speed.

LOW DEPRECIATION due to their extra long life.

LOW COSTS of operation and maintenance.

RUGGED CONSTRUCTION for rough usage in hard service.

Use Exide Diesel-Starting Batteries for all heavy-duty services—in buses, trucks, tractors, off-the-highway equipment, ships, power plants, diesel-electric locomotives.

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 2
Exide Batteries of Canada, Limited, Toronto
"Exide" *Reg. Trade-mark U.S. Pat. Off.*

1888 . . . DEPENDABLE BATTERIES FOR 64 YEARS . . . 1952

THE PICKEREL:

One of the Navy's famed "Guppy" class emerges at a 48-degree angle from 150 ft. depth. That's performance! The kind of performance that has always characterized the ships and men of the "silent service" in peace and war.

Two years ago, the snorkel equipped Pickerel made a 5200 mile run in 21 days without re-surfacing.

Ships, Men and Engines!

(OFFICIAL U. S. NAVY PHOTO)

The Pickerel is equipped with FAIRBANKS-MORSE *Diesel Engines*

FAIRBANKS-MORSE,

a name worth remembering

DIESEL AND DUAL FUEL ENGINES • DIESEL LOCOMOTIVES • ELECTRICAL MACHINERY • PUMPS • SCALES • RAIL CARS • HOME WATER SERVICE EQUIPMENT • FARM MACHINERY • MAGNETOS

FAIRBANKS, MORSE & CO., 600 South Michigan Avenue, Chicago 5, Illinois

ONLY

LURIA ENGINEERING

offers the

ADVANTAGES *of*

STANDARDIZED BUILDINGS

plus all the

adaptability,

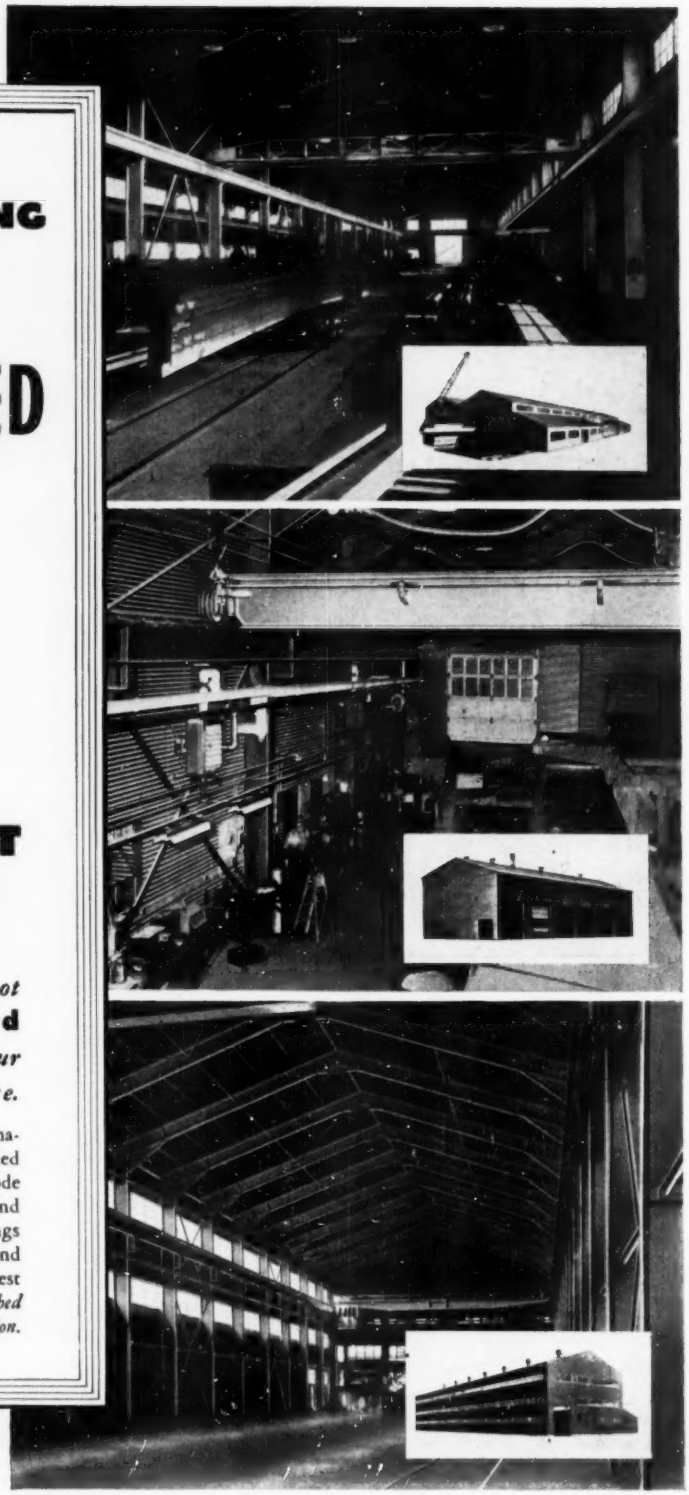
flexibility *and*

durability *of*

CUSTOM-BUILT STRUCTURES

Your expansion program need not be a problem. For **high speed** *and* **low cost** *. . . contact your nearest* **LURIA** *representative.*

To achieve utmost *durability of structure*, the materials and construction of Luria Standardized Buildings meet the *most stringent* building code requirements. And because of their *flexibility* and *adaptability of design*, Luria Standardized Buildings make possible almost any type of structure and almost any type of architectural treatment that best suit *your* particular requirements. *This is accomplished without sacrificing the economies of standardization.*



LURIA ENGINEERING
CORPORATION

500 FIFTH AVENUE • NEW YORK 36, N. Y.

DISTRICT OFFICES:
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HAULING OUT THE HEAVYWEIGHTS . . . another tough job that demands AMERICAN BOSCH performance

Hustling out the big butts is a mighty tough job – but giant Diesel logging trucks take it in stride. These heavyweight haulers rumble over specially-built logging roads, daily shouldering loads that may scale fifty tons or more. Plenty of dependable power's a "must" – and that's why American Bosch products are on the job.

Reliable, precise fuel injection is one big reason for the sweeping success of the modern Diesel engine. And American Bosch has long been the leading supplier of fuel injection systems to Diesel engine manufacturers. That's because American Bosch Diesel injection pumps and nozzles – although built to amazingly fine tolerances – provide long-lived, economical performance in the severest service.

For over forty years, American Bosch has maintained a unique reputation for advanced design, precision manufacture and widespread, thorough service. Continuous research in the automotive, aviation and Diesel fields helps to keep it that way. American Bosch Corporation, Springfield 7, Massachusetts.

AMERICAN BOSCH

STANDARD ENGINEER'S REPORT

DATA

LUBRICANT: RPM Delo Oils

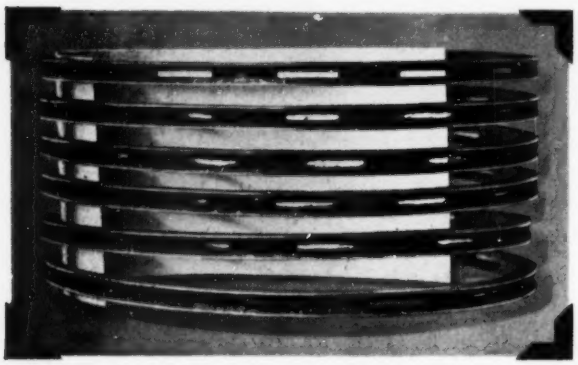
UNIT: D-8 Caterpillar

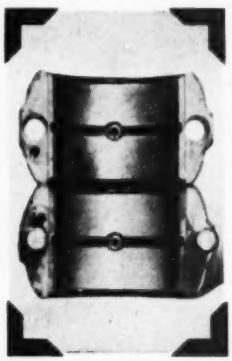
SERVICE: Earthmoving contract work

CONDITIONS: Heavy loads — dirt, dust

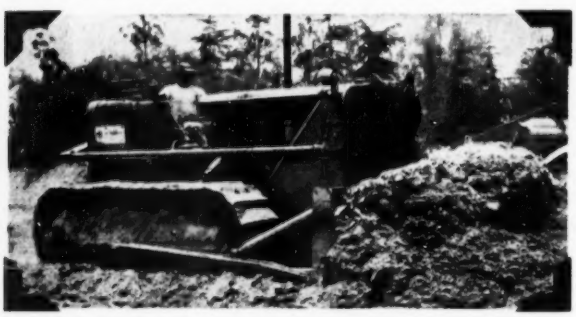
FIRM: T. H. Walsh-Argo Engineering Company Los Angeles

Engine parts "like new" after 7721 hours!





THIS SET OF OIL RINGS and the piston and con-rod bearing at right—all from a D-8 Caterpillar using RPM DELO Heavy Duty Lubricating Oil—appear just as they did when removed after 7721 hours of earthmoving work. There were no broken or stuck rings; the oil-return holes were open; all parts were free from deposits. The crankshaft was not more than 0.001 inch out of round at any point and was reinstalled.



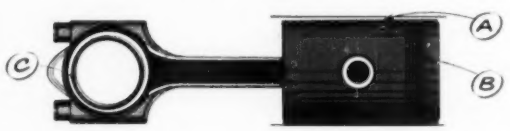
THE D-8 "CAT" above is the one from which the parts came. It is one of 11 large diesel tractors operated by the T. H. Walsh-Argo Engineering Co., Los Angeles. By using RPM DELO Oils, the company regularly gets 5000 or more hours between overhauls.

FREE BOOKLET on the RPM DELO Oils gives you complete information on how to meet any heavy-duty engine operating condition with one of these oils. Write or ask for it today.

RPM DELO LUBRICATING OILS

TRADEMARK "RPM DELO" REG. U.S. PAT. OFF.

How RPM DELO Oils reduce wear, corrosion, oxidation in all Heavy-Duty Engines



A. Contain special additives that provide metal-adhesion qualities...protect parts whether hot or cold, running or idle.

B. Anti-oxidant resists deterioration of oil and formation of lacquer...prevents ring-sticking. Detergent keeps parts clean...helps prevent piston scuffing.

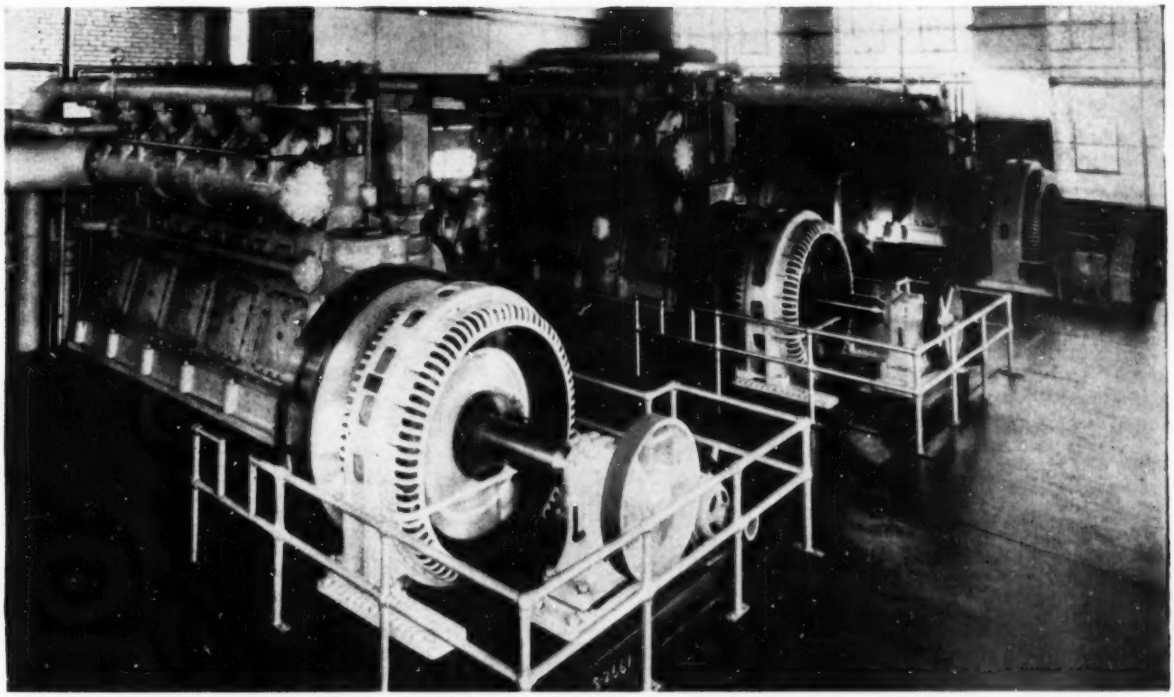
C. Special compounds stop corrosion of any bearing metal and foaming in crankcase.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor handling them, write or call any of the companies listed below.

STANDARD OIL COMPANY OF CALIFORNIA
225 Bush Street • San Francisco 20, California

THE CALIFORNIA COMPANY
P. O. Box 780 • Denver 1, Colorado

STANDARD OIL COMPANY OF TEXAS
P. O. Box 862 • El Paso, Texas



ENGINES IN FOREGROUND ARE ORIGINAL UNITS installed in 1939. Background engine is the latest supercharged unit installed in 1950. Another supercharged unit, placed in service in 1947, is not shown in this view. The output of this plant has increased from 952,600 kw hrs for the first year to 3,792,900 kw hrs for the year ending December 31, 1951.

Power plant is financial asset for city of Odessa, Missouri

PROFIT used to pave streets, pay off water and sewage bonds, operate water department, and to pay for power plant itself.

Odessa, Missouri, is an agricultural trading center 38 miles east of Kansas City.

In 1939 the town took a big step—they started operation of a power plant that has since provided the small part-farm, part-suburban community with continuous, dependable, economical power. And equally important, it brought new income that did more than pay for power plant operation.

It also helped pave the streets, pay off water and sewage bonds, and is paying off the cost of the new plant itself.

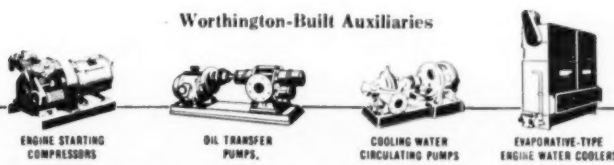
In spite of the high profitability of plant operation, rates have been lowered twice, and are today as low as can be found anywhere in the state.

Much of the credit for the success of the plant goes to the high operating efficiency of the four Worthington Diesels. After the two original units had been in service about eight years, the first supercharged engine was installed in 1947. An additional supercharged unit was placed in service in 1950. Present output of the plant is 13.5 kw hrs per gallon with a load factor of 69.5%. The two supercharged engines—at this same load factor—averaged 14.0 kw hrs per gallon.

If you are interested in learning more about how modern Diesels, dual fuel, or high compression gas engines can help you reduce your power bills, write to Worthington Corporation, formerly Worthington Pump and Machinery Corporation, Engine Division, Buffalo, New York.

E.2.3

Worthington-Built Auxiliaries



Economical Continuous Power—Diesel Engines, 150 to 2,640 hp . . . Gas Engines, 190 to 2,880 hp . . . Dual Fuel Engines, 150 to 2,640 hp.

WORTHINGTON

Engines

"Our Country's Strength is Created . . ."

REESE H. TAYLOR
President, Union Oil Company of California

"Our country's strength is created by the responsibility and solidarity of individual citizens in a self-chosen government and economy. It can—and must—be perpetuated against all who seek to undermine it. The men and women who invest regularly in United States Defense Bonds are contributing to our national integrity and to the traditions of personal independence so characteristic of a free people."

Every pay day, 6,500,000 employed men and women . . . "are contributing to our national integrity and to the tradition of personal independence . . ." by the systematic purchase of United States Defense Bonds.

How important is this contribution to national economy and personal security? Let's look at a few figures.

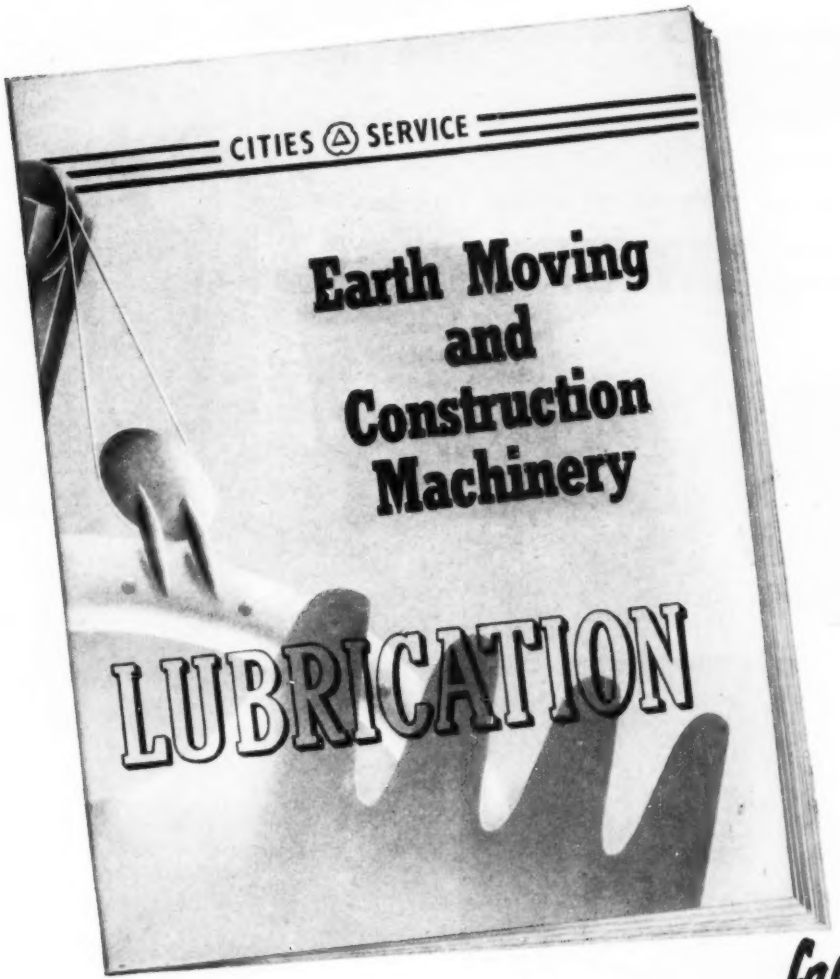
- the cumulative purchases of 6,500,000 Payroll Savers add up to $130,000,000 per month.
- the number of individual E Bonds sold in 1951 totaled 68,069,000 pieces—8% more than in 1950.
- purchases of $25 and $50 E Bonds—the denominations popular with Payroll Savers—were greater than the sales of $500 and $1,000 E Bonds.
- monthly redemptions of unmatured E Bonds during each of 9 months (April to December, 1951) were less than 1% of the amounts outstanding.
- the *cash value* of Series E Bonds held by individuals on December 31, 1951, amounted to $34,727,000,000—$4.8 billions more than the cash value of Series E's outstanding in August, 1945.

That Americans have built personal security and a reservoir of purchasing power exceeding $34.7 billions is due in no small measure to the patriotism and foresight of men like Mr. Taylor and other leaders of industry who have made the Payroll Savings Plan available to their employees.

For help with your Payroll Savings Plan, phone, wire or write to Savings Bond Division, U.S. Treasury Department, Suite 700, Washington Building, Washington, D. C.

The U.S. Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the Advertising Council and

DIESEL POWER and DIESEL TRANSPORTATION



Have you received your 1952 free edition?

FOR YEARS, men in construction and allied fields have found this lubrication book tremendously helpful. It not only discusses the basic fundamentals of lubrication, but it gets right down to specific lubricating techniques for all your equipment.

Proper use of the practices outlined in this book, plus the full line of Cities Service Quality Lubricants can:

- **Lengthen the life of your equipment.**
- **Increase productivity.**
- **Speed up operation.**
- **Save on operating costs.**

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PONCA CITY, OKLAHOMA
Mr. R. W. Bayerlein
Nordberg Mfg. Co.
Milwaukee, Wisconsin
Dear Mr. Bayerlein:
Just a note to let you know that our plant is running fine. We have pulled the heaviest electric load in the history of our plant during the past three months. Hot weather hit here about June 15 and air conditioners and fans together with an increased seasonal load taxed our plant and electric system to capacity and over. We can pull roughly 7000 kilowatts with all Nordberg engines running and take care of the swings, etc. This summer we had 7300 kilowatts for hours every day and with an outside temperature of 100 to 108 degrees generating a total of 3,301,000 kilowatt hours for the month.
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It might be of interest to know that last year our plant cost including depreciation was about 5¼ mills, this year with the increased load we are doing still better.
Yours truly,
PS/ns
Pat Schlesinger, Supt.
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AS Mr. Schlesinger's letter points out, Ponca City, Oklahoma, has set an impressive record for dependable, economical power production . . . thanks to sound, efficient management and the reliable, low cost operation of Nordberg Diesel and Duafuel power.

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NORDBERG MFG. CO., Milwaukee, Wisconsin

P252

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A DIVISION OF NORDBERG

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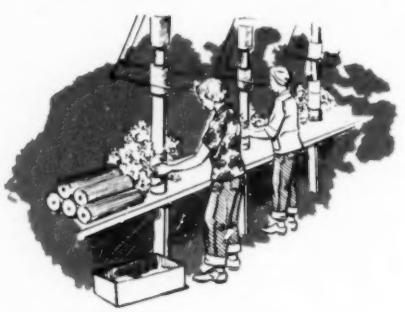

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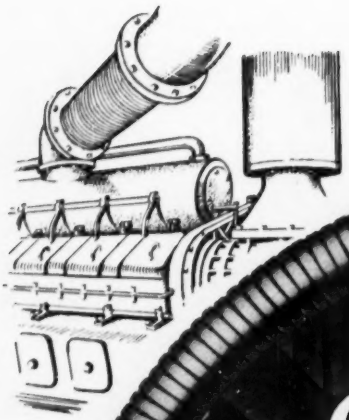
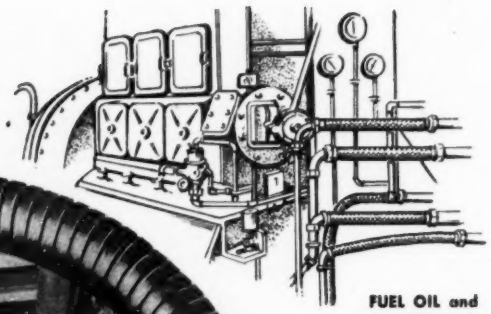
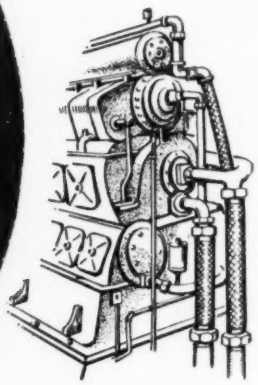


EXHAUSTS and AIR INTAKES



FUEL OIL and STARTING AIR LINES



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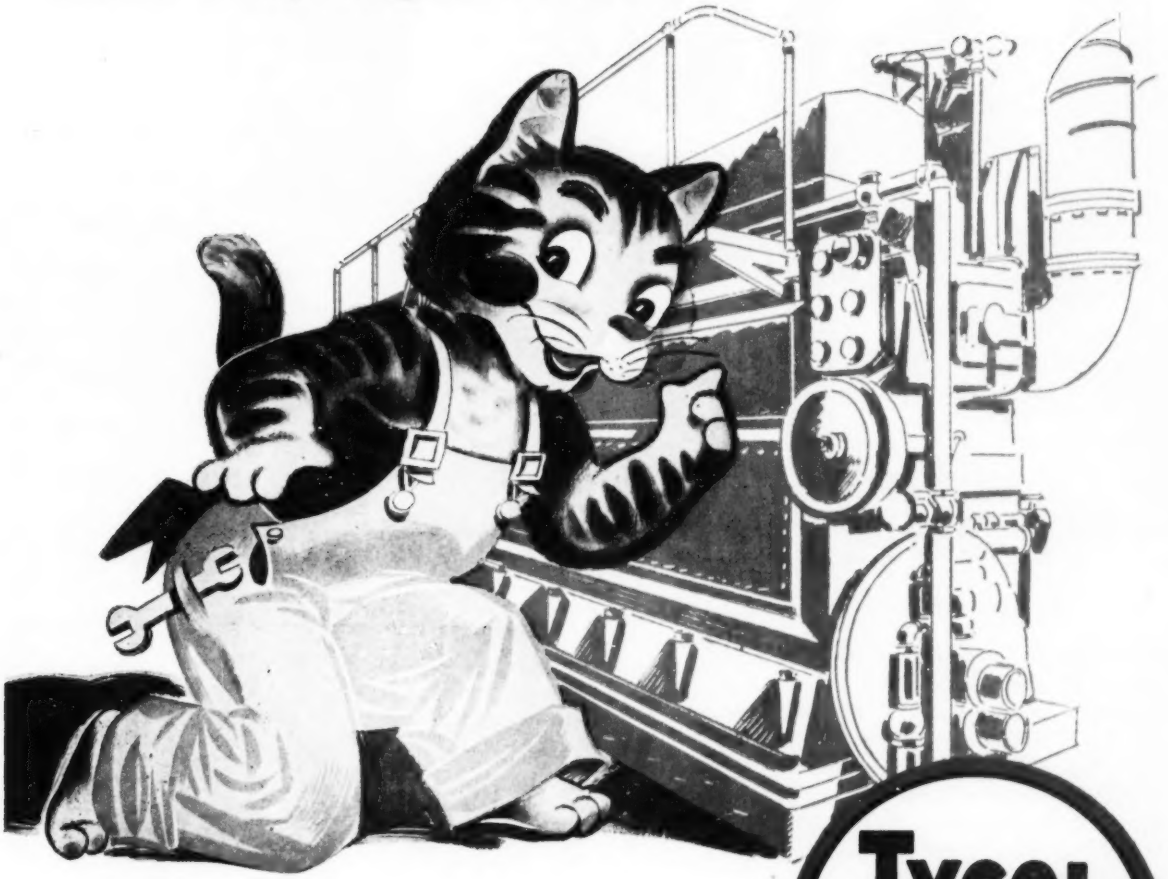

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May, 1952

Vol. 30, No. 5

Cover Photo: A far cry from the McKeen railcar, one of the earliest of rail motor cars, is this modern Southern Pacific diesel streamliner. The Southern Pacific System, which operates under a wide range of conditions, has long realized the advantages of this type of power.

EDITORIAL

Do What the Man Says 27

SPECIAL FEATURE

Protecting Idlewild From Fire 40

ARTICLES

The "Plus" in Arctic Maintenance 30
Duafuel Cuts Purchased Power Costs 34
Twelve Years of Pipe Line Service 36
Pre-Fab Locomotive Shop Facilities 46
Conditioning Diesel Exhaust Gases for Mine Locomotives 48
Army Transportation Corps Gets a Flexible Road Switcher 51
Continuous Dehydration of Fuel 52
Cleaning a Bowl in 15 Minutes or Less 54
Cutting Trucking Costs with Diesels 56
Some Things to Know About Picking Mufflers 59

DEPARTMENTS

Highlights 29
Washington Slants 39
Diesel Briefs 44
Straight from the Tool Box 62
New Products 64
Field Notes 76
Advertiser's Index 90

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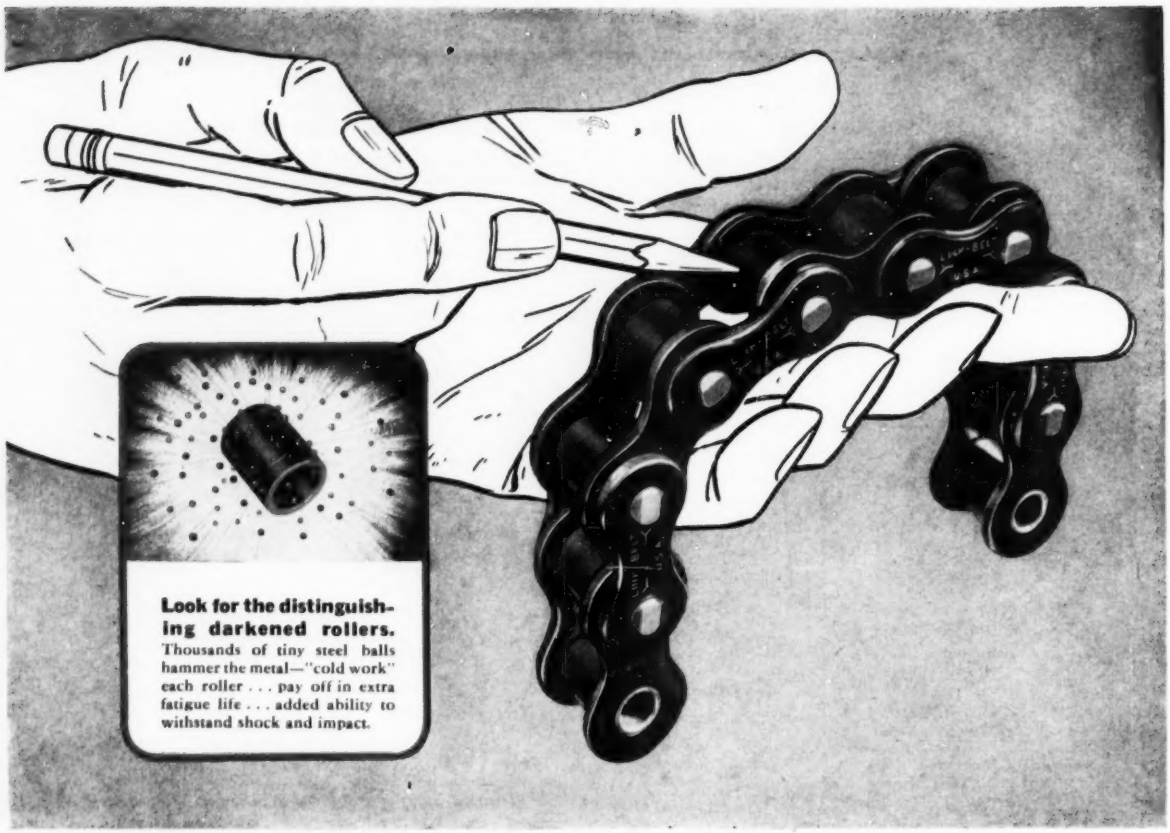
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Editorially Speaking . . . .

Do What The Man Says

WE WANT TO TELL YOU about an old lady that we know and whose cooking we frequently eat. She has been cooking a long, long time. Things change with time and some of the results are interesting in a revolting sort of way.

Frozen food is a comparative new development and a very handy thing. Each packer, however, has his own directions for cooking based on the extent of prior processing. We like broccoli and we like it as the Italians say "al dente". What comes up? Green mush!

Then we say, "Why don't you read the directions on the package?"

The answer comes back, "I have been cooking for 50 years and I always cook broccoli for 30 minutes."

Our answer is, "Do what the man says."

Next, we buy some new-fangled precooked rice. This, again, we like firm and slightly hard. What comes up? White mush!

We go through the same routine, winding up by saying, "Do what the man says."

This goes on with a wide range of products and you would be surprised what can be done with prepared pastry mixes. It would be funny if we didn't have to eat the darn stuff.

Now, comes the commercial. Can't you see a marked resemblance between this sequence and some of the things that happen in the diesel field? The common denominator is that some people simply will not read directions, follow instructions, and generally keep up with things.

Manufacturers spend a lot of money to produce instruction manuals, arrange schools and supply technical services. But do all their customers use these facilities —and above all, believe what they are told? Not by a long shot!

We had one experience where an "old-time" operator was running engines designed for a water outlet temperature of about 160° F down at 110° F. He had been told by the engine builder and when he complained about sludge, by the oil supplier. We told him again, and got the characteristic answer, "I've run them this same way for 20 years, and will keep on doing it."

So, he will continue to foul up perfectly good engines. Oh yes, he also commented that his cooling system wasn't big enough, either. Sometimes with peak loads his temperature went up to 115° F! Some one should have the authority to simply say, "Do as the man says."

In another case, a piston ring maker found that some of his rings incorporating new design features seated more rapidly and did a better all-around job if the glaze on liners was left unbroken during reringing jobs. They advertised it; their representatives preached it. Still, some mechanics are breaking the glaze and wondering what is wrong.

Another opportunity to blast, "Do what the man says." We could go on and on.

The whole problem is one of overcoming the very human trait of inherent resistance to change. To utilize fully all of the modern technological developments, this must be overcome. In short — "Do what the man says"—is a philosophy that if it can be taught will give products a better break and speed acceptance of new improvements.

Charles Edward Johnson

1875 • 1952

CHARLES E. JOHNSON was born on a farm near Newaygo, Michigan, in 1875. He became, in turn, a woodworker, a cabinet maker, a laborer in a bicycle factory. He designed camshafts for Muskegon Motor Specialties and became tool room foreman for Continental Motors.

In 1911, with Paul R. Beardsley, he founded the Piston Ring Company, which later became the Sealed Power Corporation. They produced their first piston rings at night and during weekends, while holding other jobs. The quality of the rings soon brought orders that required full-time operation. The two partners then went on the payroll at 30 cents an hour each.

Mr. Johnson's inventive genius resulted in better and better piston rings. Ultimately he held dozens of patents and his insatiable interest in things mechanical persisted to the instant of his death which took place as he was working on the engine of his automobile.

Today, Sealed Power Piston Rings, Pistons, Cylinder Sleeves, and Motor Parts are known and respected all over the world. Sealed Power Piston Rings are used as original equipment by manufacturers of more than 80% of all makes of passenger cars and commercial engines.

The story of Charles E. Johnson and Sealed Power is another splendid chapter in the American saga of free enterprise.

Sealed Power Corporation

MUSKEGON, MICHIGAN

+ HIGHLIGHTS +

● Standard Oil Company of New Jersey recently reported a net income for last year of $528,461,000—the largest of any private concern. About 60 per cent of the income was earned by subsidiaries operating outside the U. S.

● Class I railroads in 1951 spent $2,175,859,000 for materials, fuel and supplies of all kinds used in connection with their operations. This was the largest amount expended in any year with the exception of 1948, when they spent $2,183,331,000 due to the fact the fuel bill that year exceeded 1951 by $211,543,000.

● When someone says, "How are your nylons holding up?" they may be talking about some shaft bearings. Nylon plastic bearings have proven superior in certain applications (not engine bearings). They show good resistance to abrasion, heat and chemical attack, are strong, quiet, and have low friction drag. Pretty good running dry, too.

● Westinghouse announces an electric locomotive using newly developed ignitron rectifier tubes. Means that ac. power can be used on the catenaries and rectified in the locomotive. Good deal, but you still have to generate the power, distribute it and pay the costs of high voltage lines, sub-stations, transformers, etc. Nope! We think the diesels will be around a while.

● Friedrich Krupp A. G. is reportedly starting construction of a locomotive factory in Brazil. Worked out with Dr. Adhemar de Barros of powerful industrial combine, Importadora & Exportadora Brazileira, M.O.T.S.A., representing Krupp interests. Sixty diesel-hydraulic locomotives per year are planned initially with 120 per year in three or four years. Are we missing a bet?

● Five gallons of fuel oil will haul one ton of freight from New York to Los Angeles—you have to use a diesel to do it though.

● According to statistics compiled by the American Association of State Highway Officials, there were about 435,000 miles in need of improvement at the end of 1951. How about using a little of the federal excise tax to put these roads in shape?

● Looking at the "jet scoop" hoods on some late model cars brings to mind that we've been "jet scooping" diesels for some time. Idea is to pack cooler air (not taken through the radiator) into the engine. We call it "intercooling" or we simply pipe the air from outside the building.

● "Engineer to radar man. Are we approaching station? Should I start applying brakes?" This could happen if tests run by Italy's State Railway System on the Milan-Rome-Naples run work out. Trains are equipped with radar for greater safety during bad visibility in mountains.

● Two training films on statistical quality control are reported available to industry on a free, short term loan basis. Entitled "Process Control" and "Acceptance Sampling", they are for training Naval Inspectors of Material. Contact Industrial Service Branch, Office of Public Information, Dept. of Defense, Wash., D. C.

● Example of non-objective reporting. Headline in newspaper — "Diesels Termed Hazard". Substance? American Medical Ass'n. Journal says that chromate salts used for cooling system treatment can be injurious to skin. Should use rubber gloves, boots, aprons, etc. when handling. Bet it wouldn't do you any good mixed with ginger ale, either!

● Dieselization of the Texas and Pacific Railroad was completed with the delivery of two 1500-hp. F-7 "8" units, eight 800-hp. SW-8 diesel switchers and six 1500-hp. road switchers.

● Movement is under way to establish standards for piston rings used in diesel and gas engines, steam engines and compressors. Ring manufacturers seem in accord as to the desirability of such a move and it is possible that it will be sponsored by the Oil and Gas Power Division of the ASME.

● Proved reserves of liquid petroleum and natural gas reached new all-time peaks as of Dec. 31, 1951. Liquid petroleum reserves now stand at 32.2 billion bbl.—an increase of 2.7 billion bbl. over 1950. Natural gas reserves now stand at 193.8 trillion cu. ft., a net increase of 8.2 trillion cu. ft. over 1950.

● Permian Basin Pipeline Co., a new company of Chicago, has applied to the FPC for authority to construct a 384-mile natural gas pipe line to transport gas from western Texas and eastern N. M. to points of delivery in the Texas panhandle for sale to interstate pipe line companies. The line will cost an estimated $58,180,000 and will include four compressor stations with an ultimate of 74,360 installed horsepower.

● Texas Illinois Natural Gas Pipeline Co. has applied to the FPC for authority to increase the daily delivery capacity of its pipe line system from 374 to 524 million cu. ft. To effect the 150 million cu. ft. daily increase, six new compressor stations would be built, each one having seven 2000-hp. units. In addition, two 2000-hp. units would be added to each of the five existing stations, making a total additional horsepower of 104,000.

Dozer being completely torn down in the field, will be back in operation within 24 hours—or else!

Dozer blades brittle with cold, sometimes break in the field.

The "Plus" in Arctic Maintenance

by James Joseph,
Bureau Chief, Western Round-Up

Regular maintenance we always have — or should have — with us. But under some conditions there is a "plus" factor that must be considered. Extremes of climatic conditions — heat of the tropics or, as in this case, cold of the far north — accentuate the "plus" factor.

Here are some of the arctic "plus" factors. This type of field service could well supplement the current "cold weather" research being conducted by so many manufacturers. On the other hand, some of the latter's developments and techniques could well be used by the Arctic cat-skinners.

A COUPLE of diesel tractors were crawling belly-deep through three feet of hard-packed Arctic snow, snow that all but covered the tops of their tracks. One was up ahead, dozing over birch and spruce. The second followed behind, clearing the brush away, leveling a road through the desolate muskegs.

This was Canada's far-northern Alberta muskegs. The "bush"—nickname for muskeg—stretched still farther north, clear into the Northwest Territories and on to the shores of the Arctic Ocean. The tractors were treading carefully just now, for the muskeg can swallow a big dozer whole.

They were making roads where no roads had ever been before. They were making them so that petroleum seismographic crews could drill shot holes, set off dynamite, and record the resounding shock waves—telling oilmen how the strata lie 5000 ft. beneath the snowy crust. This was—and is—the world's greatest search for oil, and someday these muskegs may become a Canadian "Texas."

But while operationally these northern Alberta diesel activities are drama-packed—and dangerous—the story of muskeg maintenance is, even more important.

"This is the greatest outdoor proving grounds for diesel equipment on earth," said Mike Kroyder (they call him "A.C." Mike, because he owns some Allis-Chalmers dozers). Kroyder should know. He's been dozer-probing the muskegs for about three years now, ever since the oil companies moved in. It was cold. Plenty cold. Nobody checked a thermometer because dozer operators in the North get "to sense the weather", but Mike said it was probably —30°F.

"You know, the roughest thing about this entire operation," he continued, "is winter maintenance. We've found a lot of weak points in diesel equipment. A lot of points the manufacturers ought to know about."

"Wnat's the toughest problem?" I asked.

There was no hesitation in "A.C." Mike's reply, "Bare-handed repair. You can't work on a dozer with gloves on. Oh, I know, the books say you can, but you can't."

He led me over to a dozed-out clear-

Saving a dozer from a snowy grave. Top left, dozer is almost submerged in muskeg. Bottom left, tow line is hooked onto machine. Top right, "picker" moves in and hoists dozer from hole. Bottom right, truck hauls machine to camp for repairs.

ing. On one side stood six skid-mounted shacks. These were the operators' living quarters—*sans* bath, *sans* running water, *sans* almost every convenience known to mankind. A dozer was jacked up in the clearing. Its mechanical bowels were strewn all over the place.

A couple of men worked over the machine. I noticed that they worked without gloves, but I also observed that every once in a while they threw down their tools and made a dash for the fire they'd kindled nearby. They warmed their hands—stuck them right into the flames. And they also inspected various parts which were hung over the fire to warm up.

"This machine," said "A.C." Mike, "will be in working order tomorrow—if we have to work all night."

Working through a 22-hr., 2-shift day, 7 days a week, muskeg dozer operators have two prime worries: (1) losing their machines in a crusted-over sulphur pothole; (2) keeping their machines running.

They've worked out some field maintenance methods (some of the "plus" factors) worth discussing. With some 100 diesel crews dozing the Alberta muskegs, you'd expect plenty of "know-how"—and these operators have it.

Salvage Work

Last November an Allis-Chalmers AC-10, working in —35°F weather, sank in 6-ft. of water while crossing a frozen stream. First, they tried winching the machine to the surface. That didn't work. Then they hit upon an idea.

They built a crib around the tractor, made up of logs, notched and laid log-cabin fashion one atop the other. They relied upon the weight distributing effect of the cribbing to sustain the structure on the weak ice. When the crib was built up 6-ft. high around the hole where the tractor had sunk, they laid a few more trees across the cribbing's top, attached a winch, hooked onto the rear-end of the dozer, and raised it.

When the dozer was raised above the icy surface, they slipped other logs under the tracks, removed the cribbing, and managed to drive the tractor ashore. The entire operation required 24-hr. of continuous work. Yet, to have stopped a moment would have risked a "freeze-in" and the dozer might have been stuck the rest of the winter.

Another rescue device is what "A.C." Mike calls "a picker." He actually has another name for it, but it's unpublishable. Anyway, the "picker" is a derrick A-frame (similar to the Le Tourneau M-20) mounted on four truck tires and operated from another dozer. The frame is backed over the hole, its hook-carrying cable lowered, and the tractor is hauled out of the ice. It may seem hard to believe, but the "picker" has rescued almost every make of dozer—from the largest used in the muskegs to the smallest. This includes Internationals, Allis-Chalmers 10's and 14's; and Caterpillar D-8's, D-6's and D-7's.

Dynamite is also, surprisingly, a maintenance tool. If a dozer goes down in the muskeg, and freezes in, it takes dynamite to get it out. Holes are drilled in the muskeg, a couple of sticks dropped in, and they are detonated. This blasts chunks of muskeg loose, allows operators to hitch an-

A "cat train" heads for the "outside" as spring breakup approaches.

other dozer on and drag the stranded machine to safety.

Last season a tractor went down while crossing a river. Only the top of the cab was above the ice. It took Kroyder's men a month to dislodge the machine, and here's how they did it.

First, they laid "deadmen" logs on the ice, chopped a water hole, and froze the logs solidly in place. They attached snatch blocks to the logs, ran cables from a couple of other dozers on shore through the blocks, and tied onto the frozen-in machine. Then the ice around the dozer was blasted, the tractor loosened, and pulled free. The engine was a shambles and the machine came up in a solid block of ice.

Listing Some Problems

A.C." Mike lists tractor weaknesses in their order of frequency:

1. Tracks: Stretched out of shape, thrown and/or broken.

2. Freezing fuel lines and clogged filters.

3. Crystallization of parts, particularly dozer blades. At —40°F, blades sometimes snap off when pushing over medium-girthed trees.

4. Damage to radiators. Most manufacturers couldn't anticipate such conditions and build their radiators strong enough to withstand the extremes of outside cold and the motor's heat. Let a small tree hit a radiator, and it goes right through.

5. Poor protection for the dozer operator working where trees, brittle from cold, snap off and come flinging back into the cab.

6. Mechanical failures due to freezing, especially when lube oil congeals.

Some Answers

"Tracks", says Mike, "are the worst problem we have." The combination of cold-weather shrinkage, hillside dozing and snow and ice cause tractors to throw and break tracks too often to please northern muskeg operators. Mike admits he doesn't know the answer.

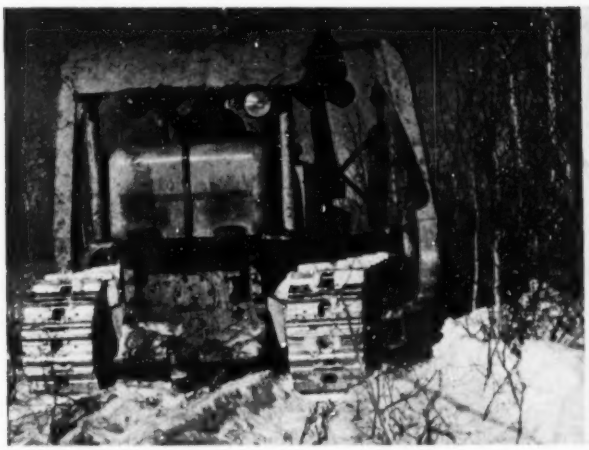
They can combat engine freezings by leaving the machines running 24-hr. a day. A 50-50 anti-freeze mixture for cold weather—say no lower than —50°F—protects the engines. Below this, a 25-per cent water, 75-per cent anti-freeze mixture is used.

Frozen fuel lines must be thawed with flame throwers. This also goes for the big 500 and 1000-gal. fuel oil storage tanks which are carried on sleds. The trouble with thawing tractor fuel lines this way is that invariably any grease or oil on the machine's surface catches fire. "No use using those standard fire extinguishers," declared Mike. "They just don't seem to work up here for hot fuel fires. Besides, they sometimes freeze up. We just shovel fresh snow on the fire, and it's out like that!" And he snapped his finger.

Every time a fuel line freezes it also means, in most cases, that filters must be removed and either cleaned or replaced. One way to thwart fuel tank freeze-ups is to keep the tanks full to the top—discouraging condensation.

Brittle, crystallized dozer blades are another problem. Trouble begins at about —40 to —45° F, and since tractors and their crews have worked

From the "business end" of a dozer, muskegs look like this.



An Allis-Chalmers HD-10 treading its way through muskegs.

Dozer tears through brush, trees, and muskeg, in building a road.

in as low as —62° F crystallization is no isolated worry. Crystallization can be minimized, thinks Kroyder, if the operator uses care in extremely cold weather. Besides the blade, almost every hard-working part of the engine, transmission, tracks, etc., is subject to cold-weather breakage.

One big factor of cold-weather operation is that a driver's efficiency is generally cut down, which means he doesn't move as fast—and neither does his machine. This helps to limit breakage. But neither are his reactions up to par, and so it is hard to get the "feel" and "baby" the equipment in tough spots.

Dozing down trees up to 30-in. diameter, muskeg-working tractor crews complain about the vulnerability of standard-make radiators. They're too easily punctured. First, these brittle muskeg trees are rock-hard, and so are the radiators, subject to extremes of freezing and heating. When they meet a tree head-on, the tree usually wins. Then, complications set in.

When the radiator springs a leak, the engine must be shut down. It promptly freezes, or at least the oil congeals. The tractor's battery, no longer warmed by the motor exhaust, loses much of its strength (at least 50 per cent) and won't start the engine.

Meanwhile, as these complications set in, the maintenance men are working bare-handed with only a nearby fire to warm them. Sometimes the radiator repair (or replacement) job takes hours. And even when completed, there's likely to be another couple of hours wasted trying to get the tractor started, and back on the job again.

On some occasions, the tracks' friction melts the snow, which promptly freezes, binding the tracks. And any tractor out of action for a long period is subject to condensation—and to clogged fuel lines. All these maintenance problems arise, you'll recall, from a punctured radiator. Special arctic radiators (heat transfer is less of a problem) or better shielding is indicated.

Poor protection for the operator is another worry. Last year a dozer driver was run through by a brittle sapling. He died before help could reach him. There's need, in the muskegs, for closed cabs, and certainly for butane or kerosene heaters, completely independent from the engine.

When there's a breakdown (every breakdown which requires a driver to leave his warmed, canvas-enclosed cab is considered "major"), the first thing operators do is build a fire. They may also rig canvas wind-breaks around the tractor. Often, they used flame throwers to warm metal parts since touching them bare-handed "burns like dry ice—and can take your skin off in chunks."

If a track is involved, almost always it must be spread and a new section put in. Replacing a track section often requires gloves, because it is difficult to heat the section warm enough to be safely handled.

Spare Parts

There is no special maintenance schedule in the field. Since the operators "live" with their machines, they easily detect troubles. Besides, it's not unusual for a tractor working a six months' winter stretch to end up the season with most of its parts replaced.

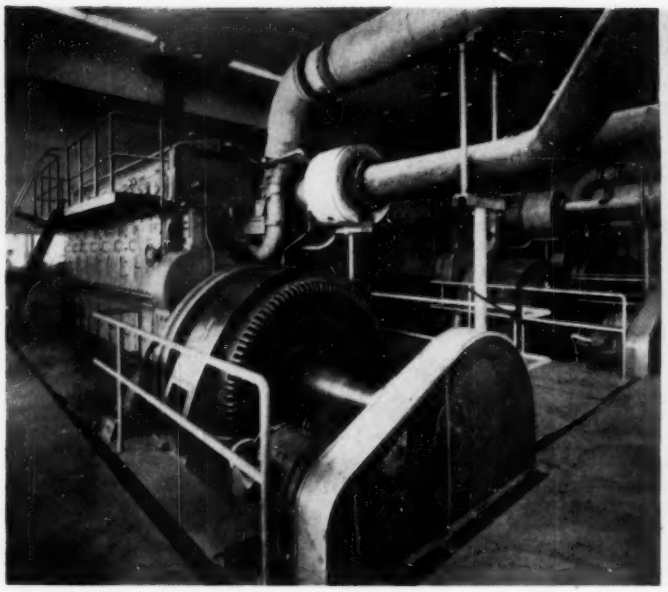
Another muskeg maintenance problem is getting spare parts. Usually each crew carries with it a skid-mounted parts supply shack. "But we can't guess all the troubles," says Mike, who has waited three weeks for one small part. And that had to be dropped by bush plane.

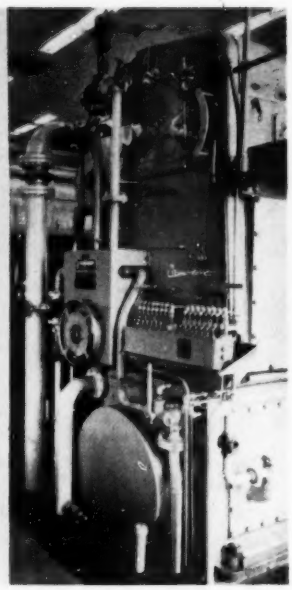
To forestall these periods of "down time," Mike brought in some old Canol dozers which last saw action near Norman Wells, even farther to the north, during the wartime Canol project. He has these on hand and cannibalizes them when necessary. "Their tracks," he says, "are still good—even though you can't say much for their engines."

In General

It is obvious that this type of operation is not for the novice. In spite of conditions, performance must be maintained. Generally, a dozer crew working two machines can cut 1½ to 3 miles of muskeg roads during the 22-hour day.

This has been a glimpse of the everyday problems of muskeg-working dozer crews. "They haven't written any books on muskeg field maintenance," says Kroyder, "but by the gods, they ought to."





Operating side and end of the three 1750-hp. Nordberg supercharged Duafuel engines. A fourth identical engine is now being installed at the Jackson,, Minn., plant.

Duafuel Cuts Purchased Power Costs

This agricultural community is now harvesting profits as well as crops with a Duafuel co-op plant. Power is generated at a production cost of 5.709 mills per kw.hr.

*by Marvin J. Johnson**

FOR 13 years as a distribution cooperative, the Federated Rural Electric Association at Jackson, Minnesota, bought all the energy it used. In 1949, however, it was necessary to plan for additional power because of the co-op's growing membership and the increased utilization of electric equipment by farm owners. Since suppliers of power at that time were unable to take the growing load, plans were drawn up and a plant built with three 1750-hp. Nordberg supercharged Duafuel diesel engines.

Land, building, other structures, heavy machinery, other equipment and furniture cost $828,199. The money was borrowed from REA on REA's regular terms of 35-year loan at 2 per cent interest. On June 30, 1951, the distribution system, serving Jackson county and three-fourths of adjacent Martin county, over its 1806 miles of line, was valued at $2,183,477 without depreciation. Generating and distribution systems, as one entity, represented an investment of $3,011,677.

This was a big business, owned by 4259 consumer-members and governed by directors of their choosing.

Full-time operation began January 1, 1951. In the next six months the gas-burning units produced 6,728,200 kw. hr., more than 55 per cent of the total volume used in the period. The rest was purchased from the Fairmont, Minnesota, municipal steam plant, 30 miles from Jackson.

Operation during this time was on gas, with small quantities of pilot oil, except for about 15 days of cold-weather running on fuel oil only.

Energy was produced at an average production cost of 5.709 mills per kw. hr. This was figured on net production (gross ouptut less station use) and includes operation, supervision and engineering costs, station labor, fuel gas, fuel oil, lubricating oil, certain operating supplies and expenses, and all maintenance.

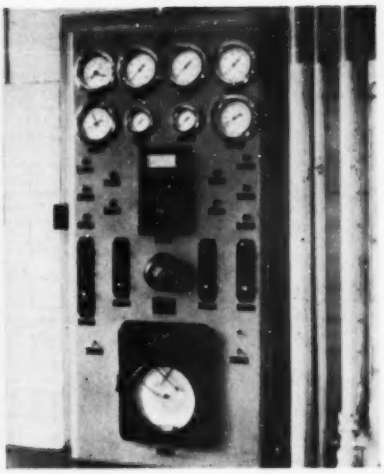
The excluded overhead costs comprised depreciation, taxes, interest, insurance, and some administrative and general costs. The excluded items amounted to 4.08 mills per kw. hr. The total generating cost, overhead items included, thus came to 9.789 mills—still under one cent.

Each of the engines are of the 4-cycle, supercharged type with 8 cylinders of 16-in. bore and 22-in. stroke and develop 1750 hp. at 327 rpm. Each engine drives a 1230 kw. Elliott generator at 0.8 power factor. This gives the Jackson plant a total horsepower of 5250 and a total kilowatt rating of 3590. This is a unitized plant in the sense that each engine with its auxiliaries forms a complete entity; the three units could be separated by miles and each function as an individual plant.

Original plans provided for a fourth engine to be installed at a later date. High production from the start indicated that this thinking was sound. The fourth engine, identical to the other three, was then ordered and delivery was made in October, 1951. It is now being installed.

*Assistant Manager of the Federal REA association at Jackson, Minn.

Auxiliary equipment for the three Duafuel engines is installed in the large open house basement.



Identical engine control and alarm panels are supplied for each engine.

The three-unit plant has operated at a running plant capacity average of 65 per cent. Output ran on an average of 10,542 Btu's per kw. hr., burning gas and pilot oil. Gas fuel is supplied at a cost of 23.5 cents per MCF.

A breakdown of fuel, oil, gas and lubricating oil costs per kw. hr. for the six months shows: gas, 2.327 mills; fuel oil 1.494 mills; lubricating oil, 0.187 mills; total 4.008 mills. This 4.008 mills forms part of the "net production cost" per kw. hr. of 5.709 mills, and also includes the short period of running on fuel oil only. In this six month period the engines used 1419 gallons of lube oil, or an average of 10,050 hp. hr. to the gallon.

In the first six months of 1950, power purchased in the area served by the REA plant amounted to 4,963,173 kw. hr. and cost $67,917. The net generation of the REA plant in the first six months of 1951 was 5,901,100 kw. hr. and cost $57,774. This volume, if bought on the 1950 basis, would have cost $80,727. The average purchase cost for the 1950 period was $0.01368 per kw. hr. This was $0.00389 more than the 1951 cost of generation, $0.009789.

Plant operators like to point out the efficiency of the engine cooling system. R. R. Staten, chief engineer, explains it:

"Radiators in this system are enclosed in a building. This was done so that freezing of the radiator in winter could be avoided by closing large sliding doors adjacent to the radiator cores and having louvred openings in the top of the building. These openings can also be controlled according to outside temperature to maintain above-freezing temperature in the building.

Cooling water from the engine flows through a thermostatically controlled 3-Way Fulton Sylphon mixing valve. There, a part of the 145° water is diverted to the radiator and the balance into the cool-water return line from the radiator. The part going to the Young vertical air delivery radiator is cooled from 145° to about 120°. The required quantity of 120° water is blended with the 145° water at the mixing valve and is drawn through by an Allis-Chalmers water pump, then through a shell-and-tube heat exchanger where the lube oil is cooled and then into the engine for engine cooling. With this method the make-up water averages 49 gal. a day with a water treating cost of $15.00 a month."

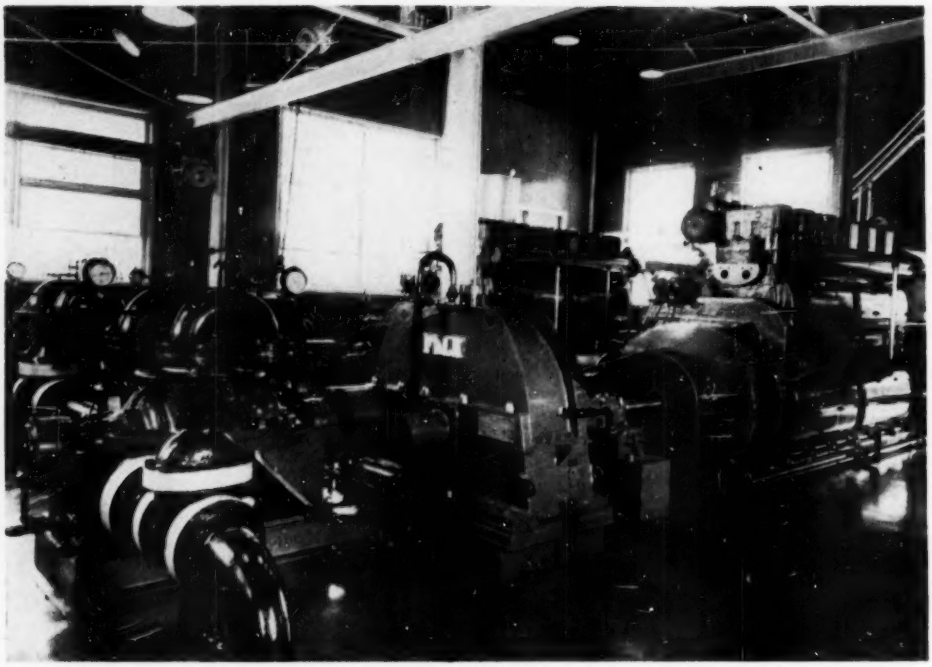
Henry Lundahl, a charter member of the association and a director from its beginning, is secretary-treasurer. Here is what is on his mind:

From 1937 to June 30, 1951, REA allotments to "Federated" totaled $3,727,000. Of that amount $2,520,015 has been allocated. There is left a reserve of $1,255,965. Against this reserve, $290,000 has been earmarked for the fourth Nordberg unit and $140,000 for a projected 34 miles of high-voltage transmission lines. Besides, some of it will go for system improvements and completion of lines partly constructed.

With the three-unit rating of 3690 kilowatts, the 1951 peak was 2770. The fourth unit will bring the rated potential to 4920 kilowatts. The estimated peak for 1952 is 3260 kw., for 1953 it is 3585, and for 1954, 3945. The present schedule calls for an expansion of the generating setup in 1954.

Table of Principal Equipment

Engines	Nordberg Mfg. Co., Model FSG-168-SC
Generators & exciters	Elliott Co.
Governors	Woodward Governor Co.
Air compressors	Quincy Compressor Co.
Air filters	Air Maze Corp.
Circulating water pumps	Allis-Chalmers Mfg. Co.
Fuel oil pumps	George D. Roper Corp.
Fuel oil filters	Briggs Filtration Co.
Fuel oil meters	Pittsburgh Equitable Meter Co.
Cooling equipment	Young Radiator Co.
Switchboard	Westinghouse Electric Corp.
Silencers	Maxim Silencer Co.
Lubricating oil pumps	George D. Roper Corp.
Lubricating oil filters	Briggs Filtration Co.
Lubricating oil reclaimers	The Hilliard Corp.
Gas meters	Pittsburgh Equitable Meter Co.
Pyrometer	Illinois Testing Laboratories, Inc.
Engine control & alarm panels	Diesel Service Co.



Each engine drives a Worthington 4-stage centrifugal pump through a speed increaser. Each pump has a rated capacity of 1400 gpm. at a total discharge head of 905.

Twelve Years of Pipe Line Service

A typical pumping station rolls up 185,000 engine hours and pumps 176,000,000 barrels of oil. Continuity of service is assured by good preventive maintenance.

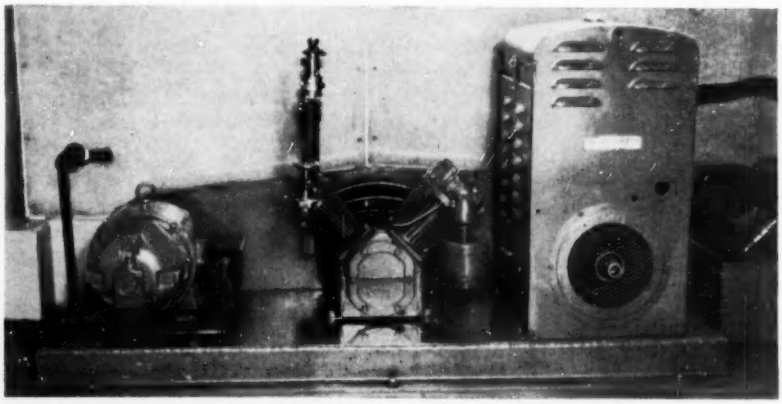
In slightly less than a dozen years, two Alco diesels in Magnolia Pipe Line Company's Anthony Station have operated a combined total of more than 185,000 engine hours. Driving 4-stage Worthington pumps, these 405-hp. engines have pumped more than 176,000,000 bbl. of crude oil at a pressure differential of about 680 psi. From November, 1939, to September, 1951, these diesels ran 89 per cent of the elapsed time with an average of only 15 days a year for all maintenance.

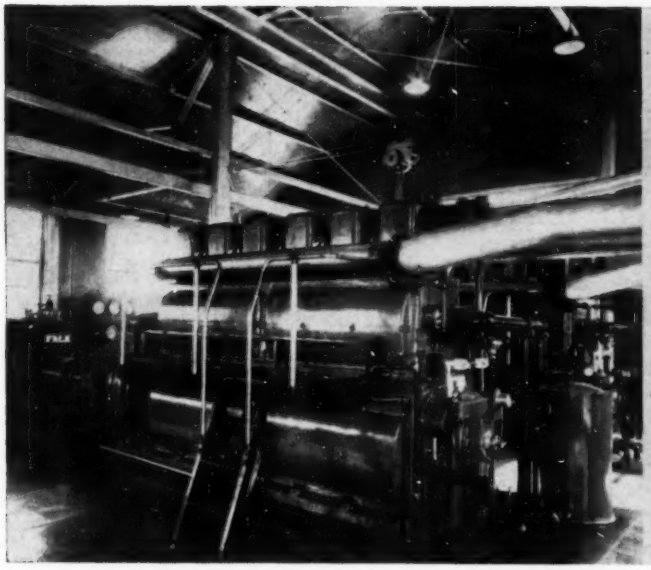
The Anthony Station, near Anthony, Indiana, is one of eight stations on Magnolia's 10-in. pipe line which extends 300 miles from Patoka, Ill., to Lima, Ohio, where it ties in to the Buckeye line for deliveries to Great Lakes and Eastern refineries. The line was put into service in 1939 to serve the Salem field in Southern Illinois and later was linked to a new 20-in. Magnolia line from Texas fields to Patoka. The availability of these pipe lines has permitted expansion of the refineries served.

Equipment and Operation

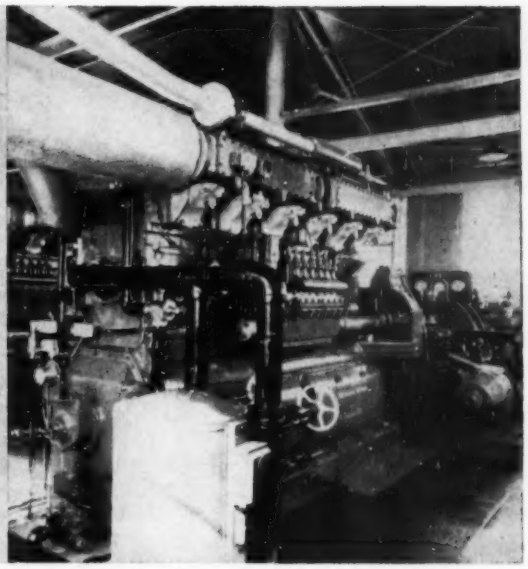
Of the eight stations on the line, four (like Anthony) have Alco's McIntosh and Seymour diesels. Each of these eight engines is a 6-cyl., 4-cycle diesel of 12½-in. bore and 13-in. stroke rated 405 hp. at 450 rpm. Each Alco drives through speed increasing gears a Worthington 4-stage centrifugal pump with rated capacity of 1400 gpm. at 905 tdh. at a speed of 2900 rpm. Each of the other four stations has a pair of Worthington diesels rated 415 hp. at 360 rpm., driving

Compressor for starting air can be driven either by an electric motor or a gasoline engine.





In slightly less than twelve years, the two Alco diesels at the Anthony Station have run a combined total of more than 185,000 engine hours.



The Anthony Station, like three more of the eight stations on this pipe line, are powered by two 6-cyl., 4-cycle diesels.

Ingersoll-Rand pumps. There are no spare units, no standbys, in the entire system.

The Worthington pumps were teamed with the Alco engines because both are operating below designed capacity and their output can be stepped up greatly merely by speeding up the engine without throwing any undue strain on the equipment. Diesels such as those which deliver 405 hp. at 450 rpm. in these stations are normally run at 600 rpm. with a rating of 450 hp. The addition of an exhaust turbocharger raises capacity to 810 hp. Thus, the engines can produce double the present power output.

Operating economy certainly is not ignored, but the emphasis definitely is on continuity of service. Refinery schedules must be met, and, in the absence of standby equipment, the engines must meet the rigorous operating schedule. To meet these requirements, company engineers have chosen heavy-duty prime movers, good protective accessory equipment and have adopted a methodical program of preventive maintenance.

Station operations are closely controlled from headquarters. Pressure differential is specified precisely from each station by the dispatcher. Pressure regulation is effected by altering engine speed. Operators are required to keep a record of rack travel in millimeters to insure a close check on engine load. Since there are no spare engines, preventive maintenance must insure continuity of service.

Providing Maintenance

All major maintenance is performed by a traveling crew with work scheduled to minimize interference with pumping quotas. Valves are ground every 14 weeks (about 2000 hr.) and since each station has a set of six extra heads, the entire heads are switched and the engine is back in service in just two hours. A fuel injection nozzle can be replaced in a scant 10 minutes.

Pistons are pulled only when necessary and some engines have run 2½ years (about 20,000 hr.) between such servicings. The company reports excellent experience with the Alco's precision bearings and cast iron pistons. After more than 90,000 hours, more than 30 per cent of the original pistons are still in service.

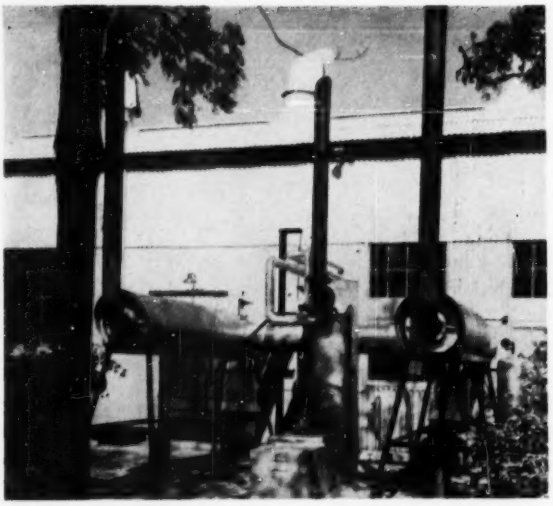
Keeping the Oil Clean

Care is taken to insure an adequate supply of clean lubricating oil. At Anthony, for example, a dual system removes contaminants from the lube. Some of the lubricating oil is bypassed from the engine pressure lubricating circuit through a fuller's earth purifier from which it returns to the crankcase. The engine runs from 500 to 700 hr. on a single filter pack. The plant also has a centrifuge in continuous operation serving the two engines alternately for 4-hr. periods.

Lube consumption has been low and could be lower if management desired it. The Alcos have run as much as 11,000 hp.hr. per gal. of lube consumed, but when an engine shows too good a lube oil consumption, in view

Engine Hours, Anthony Station

Year ending Nov. 30	Engine No. 1 (405-hp. Alco)	% Time Operated	Engine No. 2 (405-hp. Alco)	% Time Operated
1940	7895	90.1	8019	91.5
1941	7856	89.9	7980	91.1
1942	8165	93.2	8223	93.9
1943	8314	94.9	8152	93.1
1944	7990	91.2	7978	91.1
1945	7829	89.6	7947	90.7
1946	7963	90.9	7957	90.1
1947	7244	82.6	7271	83.2
1948	8005	91.3	7411	84.8
1949	7624	87.2	7562	86.5
1950	7713	88.3	7281	83.3
1951 (11 Mos.)	6983	87.1	6832	84.9
Total	93,581	89.6	92,624	88.7



Exhaust gases vent through horizontal Maxim silencers, passing through a Sims waste heat boiler to provide steam heat for the plant.

Principal Equipment Listing

Engines	American Locomotive Co.
Pumps	Worthington Corp.
Generators	General Electric Co.
Fuel oil centrifuge	DeLaval Separator Co.
Fuel meter	Worthing-Gamon Meter Co.
Fuel filters	Wm. W. Nugent & Co., Inc.
Lube oil	Socony Vacuum Oil Co., Inc.
Lube reclaimers	Honan-Crane Corp.
Lube strainers	Cuno Engineering Co.
Lube oil centrifuge	DeLaval Separator Co.
Heat exchangers	C. F. Braun Co.
Water circulating pump	Goulds Pumps, Inc.
Exhaust silencers	Maxim Silencer Co.
Waste heat boiler	Sims Company Inc.
Air filters	American Air Filter Co., Inc.
Pyrometers	Brown Instrument Co.
Speed increasing gears	Falk Corp.
Fuel booster pumps	Tuthill Pump Co.
Air Compressor	Worthington Corp.
Switchboard	Westinghouse Electric & Mfg. Co.
Diesel-generator set	Caterpillar Tractor Co.

of the fact that there are no spare units, the mechanics change the ring set-up to insure adequate lubrication and are content with 2000 to 3000 hp.hr. The No. 1 engine at Anthony consumed 8408 gal. of lube in 93,581 hours of operation for an average of better than 4400 hp.hr. per gal.

Using Crude Oil for Fuel

For fuel, the diesels at Anthony use crude oil taken from the line, centrifuged and stored in a 270-bbl. tank. From storage, the oil flows by gravity to two 5-bbl. day tanks in the engine room, then through meters and cotton waste cartridge filters to engine-driven booster pumps which supply the fuel injection pumps.

Since the booster pumps operate continuously, sending their overflow back to the day tanks, the meter figures on fuel consumption are substantially higher than actual consumption. The meters show that the two Anthony engines used 95,116 bbl. of fuel (42 gal. per bbl.) in pumping 172,224,359 bbl. of oil at a pressure differential of about 680 psi. This is a 12-yr. average of more than 1800 bbl. pumped per bbl. of fuel consumed. A recent month chosen at random shows even higher efficiency. In September, 1951, the engines pumped 1,218,088 bbl. of oil with suction pressure at 36 psi. and discharge at 715 psi. and consumed 504 bbl. of fuel, or 2417 bbl. per bbl of fuel.

It should be noted that each engine also drives a 15-kw., 125-volt dc. generator. Electrical load is such that average generator load on the engine is calculated to be 10 hp.

Other Engine Systems

A 260-gpm. centrifugal pump, driven at 2900 rpm. off the speed increasing gears, circulates cooling water through the engine jackets and through heat exchangers where the water is cooled by the incoming crude oil. Intake air for the engines is cleaned by oil bath filters.

Exhaust gases vent through horizontal silencers. Gases from both engines can be put through a waste heat boiler which provides steam or hot water to heat the station.

In case of low lube pressure or pipe line pressure over 800 lb., the engines are shut down automatically by the admission of compressed air to a cylinder which cuts off the fuel. This shutdown device can also be actuated manually from outside the plant in an emergency.

This is a self-sufficient plant. The starting air compressor can be driven either by electric motor or by gasoline engine. The plant also has a 15-kw. diesel-generator set which can provide electricity on the rare occasions when the main diesels are not in operation.

Results

The pipe line was designed to handle 38,000 bbl. of oil per day, but the actual average over a dozen years has been above 40,000 bbl. The rate of flow during World War II averaged 43,000 bbl. with high periods of 45,000 bbl. per day.

In 11 years and 11 months, the diesels at Anthony have run 93,581 hours and 92,624 hours respectively, never less than 82.6 per cent of a year and as much as 94.9 per cent. Operating at new engine efficiency as a result of a sound preventive maintenance program, the diesels are embarked on their second dozen years of service.

Clarification—Please Note

In March we brought you a story entitled "Treating Water for Diesel Locomotives." The author was good enough to call to our attention a portion of the text that might be misconstrued. This, we do not want.

Under the last heading on page 41, "An Important Don't," it states that "Make-up water for the cooling system should be taken from the locomotive storage tank and not from the steam generator system." This is true, but might be implied to mean *all* make-up. This should only be the source of make-up water *enroute* necessitated by leaks, etc., and should be considered strictly as an *emergency measure.*

Otherwise, make-up for the cooling system should be added only at terminal or water stops where raw water or water properly treated for the cooling system is available.

Washington Slant

EXPANSION GOAL FOR NEW ELECTRIC GENERATING CAPACITY of 32 million kw. was announced by DPA. Announcement provides basis for Defense Electric Power Administration and DPA's Office of Resources Expansion to give federal aid for achievement of goal. Recent survey indicated 30 million-kw. increase, but other programs not firmed, caused upping of 2 million kw. Goal is for Class 1 utilities producing about 95 per cent of power used by public. Expansion sought in 1952—9 million kw.; 1953—11 million kw.; 1954—12 million kw. Last year, 7 million kw. was added, highest in any one year, bringing the total to 75 million kw. Survey showed that energy usage doubles about every 10 years.

POWER GOAL BOTTLENECK is given as steam turbines, high-voltage switchgear and transformers, square and rectangular copper wire, and heavy castings and forgings. World-wide survey is planned to see if production of last two can be increased. Diesel industry can help regarding turbine shortage and smaller localized plants, municipals or co-ops, will free a lot of the copper needed for high-voltage lines and transformers.

RAILROAD IAC MEETING showed considerable dissatisfaction with low allotments. Industry was critical of DPA's decisions failing to support requirements as presented by Defense Transport Administration and NPA's Railroad Equipment Division. Operators reported "steel salesmen were parking on their doorsteps soliciting orders." Problem is not to get steel, but to get CMP "tickets." Third Quarter allotments should produce 800 locomotives. NPA's Railroad Equip. Div. wants 150 more.

LOCOMOTIVE BUILDERS MEETING brought tentative acceptance of formula offered by NPA to govern output and distribution of CMP materials starting in Third Quarter. Formula is based on production during base period (1948-50) and builders will produce in accordance with percentages during base period. Output for railroads industry, military and export are considered. Committee asked that DPA handle military requirements separately from commercial types. They also asked to be allowed to make as many engines as possible with authorized materials using inventories and conserved material. Production percentages for base period are: Alco—21.7; Baldwin-Lima-Hamilton—11.9; Fairbanks, Morse—3.6; EMD—51.4; Davenport-Besler—1.1; G-E—7.8; Plymouth Locomotive Wks.—0.04; Vulcan Iron Wks.—0.06; Whitcomb Locomotive Wks.—2.4.

PETROLEUM EXPANSION GOALS call for a world-wide total of about 90,000 new wells in 18-month period July, 52 to Dec., 53. Domestic goal is 80,000. Approved expansion in free-world refinery capacity is at rates estimated to raise total domestic capacity by end of 1953 to 8,000,000 bbl. per day, and foreign capacity (including Canada) to just over 5,000,000 bbl. per day. Also approved was an expansion of 19,700 miles of oil pipe lines and 153,113,000 bbl. of storage capacity in same period. The former will raise total mileage to about 180,000 and the latter, exclusive of retail storage, to about 1,250,000,000 bbl.

INTERNAL COMBUSTION ENGINE IAC (750 rpm. and up) told OPS that the recommended wage increase for steel workers would be reflected almost immediately in the cost of their engines. Labor cost advances in steel would soon compel requests for equivalent wage advances for engine production labor. Cost of material increases would be reflected in an average 5 per cent boost in the cost of engines.

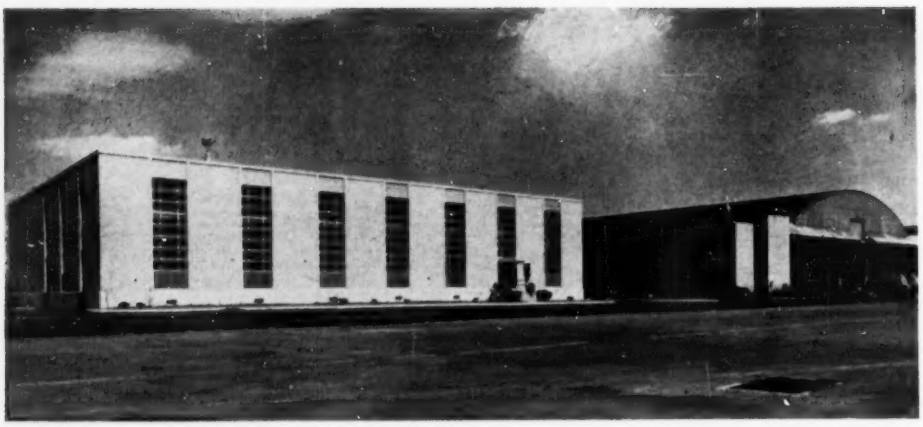
DISTILLATE FUEL PRICE CEILINGS ON EAST COAST need boost, according to IAC for this product and kerosene. Claim a "dislocation" between East Coast prices to other areas due to charter tanker rates from Gulf points. Rates fluctuating seasonally, reaching peaks during winter months at height of demand. Additional storage capacity would permit use of summer rates, but present prices do not encourage construction. One formula for upward adjustment starts with Gulf Coast prices and adds a per-gal. figure reflecting tanker rates and other increased costs. Principal subject was heating oils, but diesel fuels will probably reflect any increases.

THIRD QUARTER ALLOTMENTS for some of the major programs are:

Division	*Total Steel (tons)*	*Total Copper & Copper Alloys (000 lb.)*	*Total Aluminum (000 lb.)*
Engine & Turbine	583,000	31,823	3,435
General Components	1,161,750	183,110	22,000
Motor Vehicle	3,294,450	120,830	65,625
Railroad Equipment	1,773,373	85,950	4,970

With the exception of steel allotments for the first two Divisions, all the other allotments are up. This can be seen by comparison (see Diesel Power, February, 1952) with allotments for Second Quarter, 1952.

(*Note: Typographical error appeared in previous listing. General Components should read, under the "Steel" heading:* 1,203,225).



Modern building that houses the pumping station at Idlewild Airport. Station has dual sources—electric pumping backed up by diesel pumping of equal capacity.

Protecting Idlewild from Fire

New York International Airport at Idlewild, Queens, was opened by The Port of New York Authority in July, 1948. One of the world's largest and greatest commercial airports, it comprises 4900 acres or, in other words, an area equivalent to Manhattan from 42nd Street down to the Battery.

Along with La Guardia Airport, New York International Airport is being operated, developed and financed by The Port of New York Authority, the self-supporting agency of the States of New York and New Jersey, under a fifty-year leasehold from the City of New York.

What does an International Airport do for fire protection? Here are some of the details of how the Port Authority handled the problem.

An International Airport can be a very interesting place. All sorts of things happen on even a routine day. Important people from the political scene, the entertainment world, diplomats and statesmen, and even John Q. Public pass through it. On this one particular day, some East Indian officials were expected; a shipment of some serum had arrived from abroad and was being trans-shipped to a domestic point; and a particularly belligerent and unhappy eagle was attempting to demolish his crate—along with any inquisitive fingers that strayed his way.

Behind such scenes of activity, there is a lot of just plain business. Planes come and go and they must all be serviced and refueled. Back in the hangars, the more detailed work is performed. To support these primary functions there must be a group of secondary activities, ranging from policing to fire protection.

The latter is extremely important in view of the wide-spread use of highly volatile and inflammable aviation gasoline and for the protection of costly aircraft. It is also necessary for obtaining optimum insurance rates. To meet the Underwriters' requirements, any permanent type system must be thoroughly dependable. So, we come back to diesels.

Planning the System

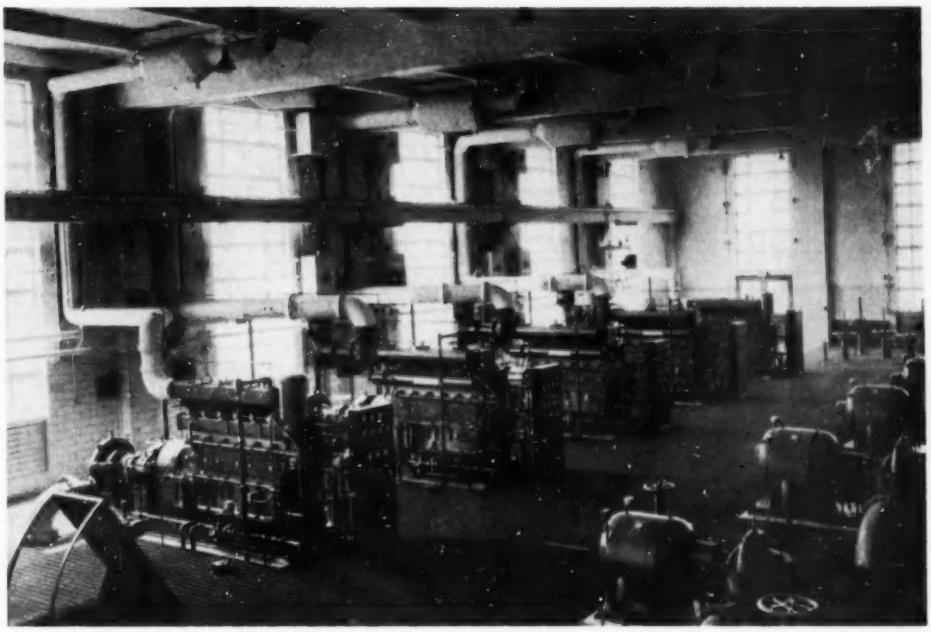
When the airport facilities were laid out by the Port Authority engineers it was decided to have a network of high-pressure hydrants, plus deluge sprinkler systems in the hangars. Thus, protection would be afforded at the hangars, the cargo operations building and the terminal area.

Criteria required by the Fire Department included provision that the system be adequate to handle two simultaneous fires in two separate hangars with all the sprinkler heads open. Everything must be dual; electric pumping alone was not enough, but had to be backed up by diesel pumping of equal capacity.

The capacity necessary for each power source was figured at 17,000 gpm. at 105 psi. which, with a 60 lb. suction would produce the required 165 psi. pump output. Ten miles of 30 and 36-in. steel main distributes the high pressure around the airport. Pump suction header is fed by 30 and 36-in. mains.

Building the Pumping Station

Bearing in mind the requirement for duplication, the pumping equipment was functionally split right down the middle, although all equipment is housed in the same building. Five electric motors coupled to centrifugal pumps and an equal number of diesels connected to identical pumps through speed increasers are provided. In addition, there is a 100-kw. diesel generator set that provides lighting and power for the controls and alarms in the event of power failure.



Interior of pumping station at Idlewild Airport. Pumping is normally done by electric pumps at right, but in case of a power failure diesel powered pumps at left take over.

Pumping motors are designed for 4160 volts and power is provided by the local utility. There are two sets of breakers and should one kick out, the emergency engine-generator starts up but does not go on its line unless the second breaker goes. If this breaker holds, the set runs for 10 minutes and then shuts down. If both breakers go, the set automatically takes over its functions, including powering the necessary alarms, holding circuits, and make-up pump.

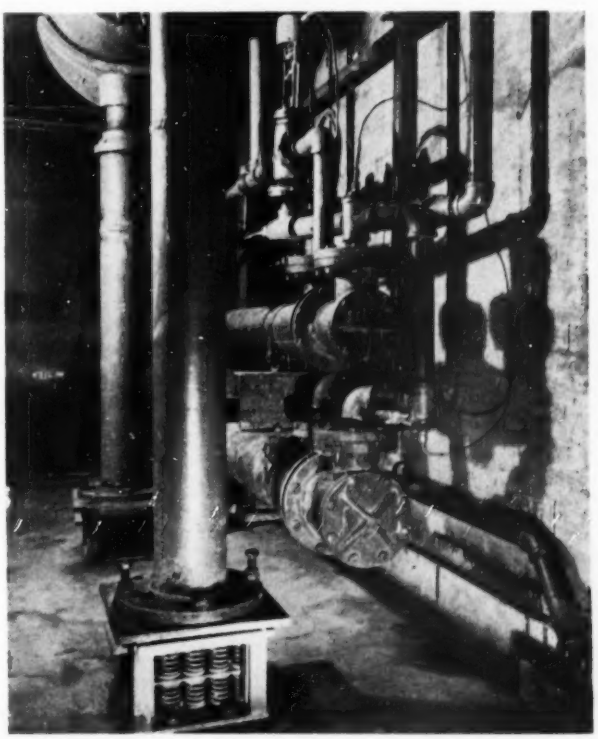
Water is actually available from three sources, two city water mains and a 1,000,000-gal., 4-section storage reservoir, occupying half of the building. City water pressure is usually between 60 to 80 psi. and pump suction can be taken from either. Check valves prevent backflow.

Pressure switches on the inlets are arranged to shut off the supply from either main when the pressure drops to 15 psi. Suction is then taken from the main with normal pressure. If both should be shut off, check valves open to permit the reservoir water to feed the pumps.

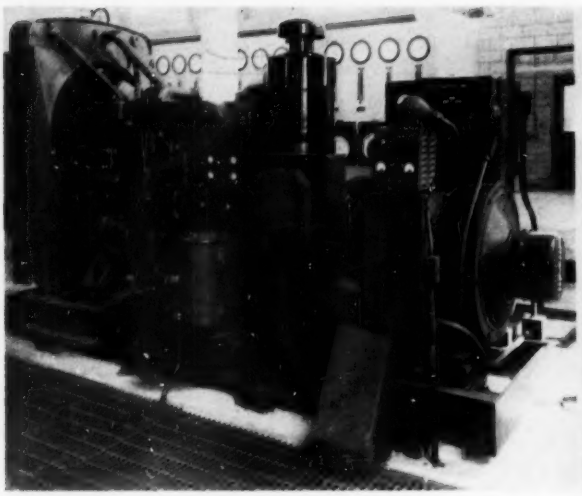
Under normal operation, pressure is maintained in the high-pressure fire mains at 165 psi. When drawing on the reservoir, however, the pressure is 117 psi. Since the reservoir provides practically no head, the effect of the city main pressure is lost. This was all considered in designing the station.

Leakage loss in the high-pressure mains is only about 15 to 20 gpm. A 100-gpm. electric-driven make-up pump is thus more than ample to hold the pressure. When water is being used and this pump is not equal to the load, a G-E control system cuts in the first fire pump, then the next, etc. An adjustable time feature in the relay system—currently set at 15 sec.—insures that pumps will not start simultaneously, or on transient pressure surges. Also, if one pump should fail to start, the next will pick up in its normal time cycle.

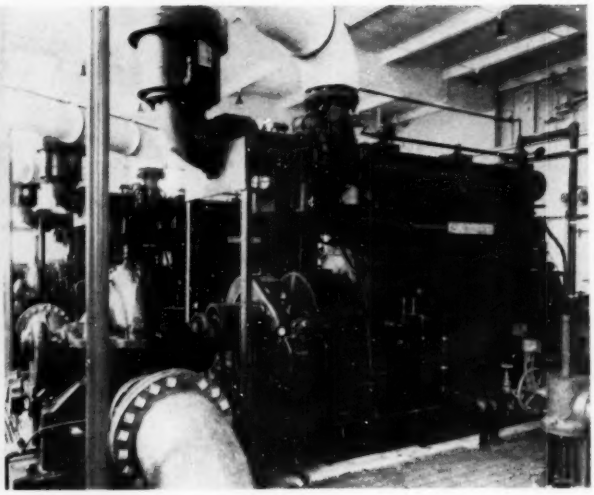
With all stand-by service it is necessary to provide a means of testing



Piping to suction and discharge side of main pumps are supported by steel columns bearing on spring-type vibration eliminators.



This 100-kw. diesel generator set provides lighting and power for the controls and alarms in event of power failure.



One of the three supercharged Superior engines connected to its pump through a Link-Belt speed increaser.

the equipment periodically in a manner closely approximating actual service. In this case a 12-in. bleeder line was taken from the high-pressure header and run back to the reservoirs. In this line is a Bethlehem flow tube so that actual pumping performance up to a limit of 7000 gpm. can be checked.

All data relative to pressures, valving, etc., are indicated on the control panel so that the status of operation can be readily determined. All of the high-pressure pumps are fitted with relief valves in appropriate by-passes back to suction.

Integrating the Diesels

Normal operation is on electric power. Should the power fail, the diesels are then started manually (with the exception of the emergency set) as needed to carry the pumping load.

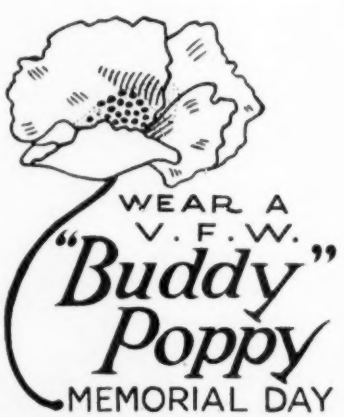
Since fires are no respecters of time, diesel pumping capacity must be equal to that of the electrical equipment of a total of 17,000 gpm.

There are five Superior engines, two Model 40-S-6's and three Model 40-SX-6's. All are 8½ by 10½-in. engines, the latter being turbocharged. They are rated 260 and 890 hp., respectively, at 720 rpm. This speed is stepped up to 1775 rpm. by speed increasers to drive the centrifugal pumps. Outputs are 2500 and 4000 gpm. depending on the driving engine and pump size.

Since the engines will ordinarily be used only in a stand-by capacity, there will not be the problems attendant to long extended usage. On the other hand, intermittent service poses its own problems. They must be turned over sufficiently often to insure immediate response in times of need and must be kept in tip-top condition.

Engine Systems

Foundations—The main pump room floor is principally of grating construction with the bulk of the piping and valving below. The engine foundations extend down to the lower level where they rest on a 3-in. layer of cork. Water piping to suction and discharge of the main pumps is equipped with Dresser couplings and supported by steel columns bearing on spring-type vibration isolaters.



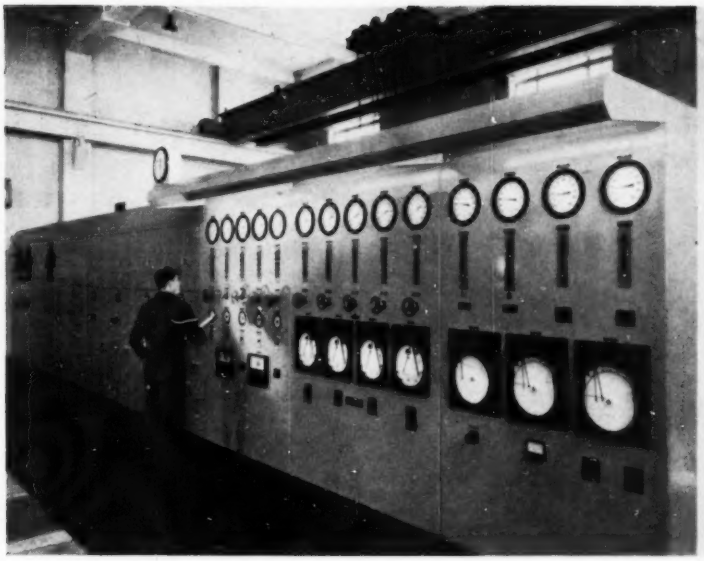
Cooling System—An indirect system of cooling is used. Located on the side of the foundation are the jacket water and lube oil coolers of the shell and tube type. The jacket water is circulated through its cooler and any expansion in this system is taken care of by a surge tank located at the building well.

City water is used. It is felt to be sufficiently soft to be used without treatment. Sodium dichromate is used as a rust inhibitor.

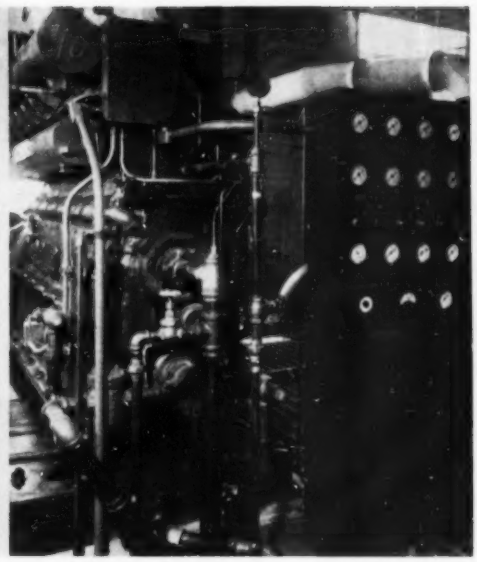
In the secondary circuit, two methods of cooling can be used. There is a circulating pump that takes suction from the reservoir and pumps the raw water through, first, the lube oil cooler and then the jacket water cooler. Discharge is back to the reservoir. This pump, incidentally, can also be used as a stripper for the 4-section reservoir should draining be required.

The second source of raw cooling water is the high-pressure header. Water is bled off through a pressure reducer, circulated through the coolers in the same manner as for the reservoir water. It is similarly dumped back to the reservoir.

Jacket water temperatures are controlled by a thermostatically operated valve that throttles the raw water flow through the coolers. A second valve, also thermostatically controlled, is responsive to lube oil temperatures and controls them by suitable operation of an oil bypass around the lube oil cooler.



Main control panel at the Idlewild station showing neat and convenient arrangement of instruments and controls.



Each engine has its own instrument panel which gives complete information on engine's condition.

Fuel and Lube Oil System—Fuel is stored in two 1200-gal. outside storage tanks. Day tanks in the building are kept full and flow to the engines from these is by gravity. A duplex filter in the line protects the injection equipment.

The base of these engines serves as the sump. The lube oil is circulated through the cooler, through a duplex strainer and then back to the header on the engine. A by-pass filter cleans a portion of the oil on each pass and returns it to the sump.

In view of the intermittent type of service projected for these engines, it was not felt necessary to provide for any batch purification equipment. Filters will be maintained and when the oil is no longer fit for use it will be replaced.

Scavenging System—Scavenging air is taken from inside the building and passed through oil bath type cleaners mounted right on the engines. The exhaust gases are piped to silencers hung below the ceiling and then discharged through the roof of the building.

Starting and Controls—All engines except for the emergency generator set use air for starting. In view of the service, starting is imperative and the air storage facilities might be considered excessive in other types of service.

The air storage tanks contain enough air for six starts by each engine before stored air pressure is exhausted.

Once started, engine speed is maintained by the hydraulic governors on the engines and overspeeding prevented by an over-speed governor. All necessary temperatures and pressures are shown on the gauge board and alarms warn of abnormal conditions.

Projected Operation

Since the plant is brand new, the operating procedures have not been worked out in their entirety.

It has been outlined how the electrical equipment will function automatically in case of fire. Visual and audible alarms are given in the pumping station if abnormal conditions develop. Also, these alarms are wired to other key spots, including the Police Emergency Garage.

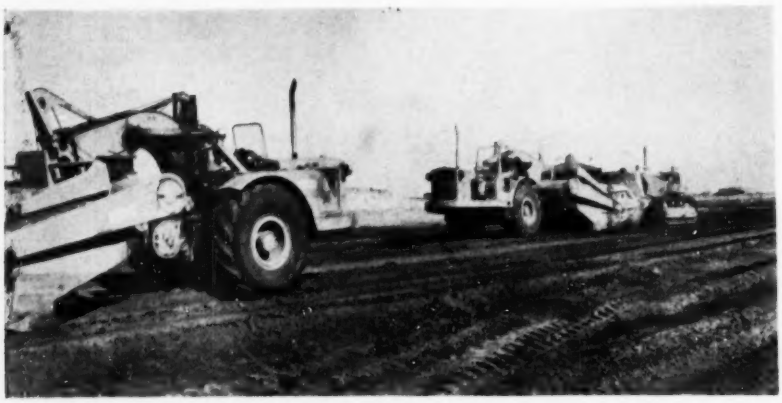
Heat for the building is provided by a boiler room in an adjacent hangar. Similarly, some of the other alarms are wired to this spot.

Thus, continuity of potential service is maintained at all times with a minimum of attendance. The need is met and every bet hedged. And as is the case in so many power installations, the final back-up is diesel power.

Principal Equipment

Engines	Superior, National Supply Co.
Pumping motors	Crocker Wheeler
Pumps	DeLaval Steam Turbine Co.
Speed Increasers	Link-Belt Co.
Coolers	
Water	Ross Heater & Mfg. Co.
Oil	Ross Heater & Mfg. Co.
Filters & Strainers	
Fuel	Purolator Products, Inc.
Lube Strainer	Purolator Products, Inc.
Lube Filter	Wm. W. Nugent & Co., Inc.
Air	Air Maze Corp.
Silencers	Maxim Silencer Co.
Instrumentation	
Pyrometers	Illinois Testing Laboratories, Inc.
Tachometers	Weston Electrical Instrument Corp.
Emergency Generator Set	
Engine	Cummins Engine Co.
Generator	Electric Machinery Mfg. Co.
Automatic controls	Synchro-Start Products, Inc.
Radiator	Perfex Corp.
Air cleaner	Donaldson Co., Inc.
Lube filter	Luber-Finer, Inc.

DIESEL BRIEFS



Diesel Speeding H-Bomb Plant

The Atomic Energy Commission's hydrogen bomb plant near Ellenton, S. C. is being pushed by a force of 25,000 construction workers and 6300 pieces of construction equipment. Known as the Savannah River plant, it will cost an estimated $1.2 billion and cover 315 square miles.

Over 20 million cu. yd. of excavation is required, and to this end Caterpillar DW21 tractors with No. 20 scrapers have been particularly outstanding. These fast-stepping 2-wheel rigs are push loaded by Cat D8 tractors and each is carrying 18 cu. yd. of payload on a 2500-ft. haul. Four of these jobs are moving 6000 cu. yd. in a 9-hour day.

One contractor, R. B. Potashnick of Cape Girardeau, Mo., completed grade on 19 miles of 4-lane highway in the area in less than 90 days with this type of equipment. Such speed is typical of all construction work in the area.

In addition to the equipment of numerous contractors, there is a large number of units owned by the Atomic Energy Commission doing a variety of jobs such as construction of 60 miles of railroad grade and the laying of 85 miles of underground water pipe.

About 20 miles upstream on the Savannah River, the U. S. Engineers are working on an earth fill dam to produce 250,000 kw. of electricity and impound over 2 million acre ft. of water.

Army Orders 83 Switchers

Eighty-three Alco-GE light-weight locomotives, capable of operating on nearly any wide gage track in any climate in the world, have been ordered from General Electric by the Army's Transportation Corps Depot at Marietta, Pa. They will be powered by standard Alco 12-cyl., 1600-hp. diesel engines.

Delivery of the $14,296,790 order is scheduled for 12 months, depending upon materials allocations. The contract for the versatile 120-ton unit is the Transportation Corps' largest locomotive order since World War II.

Nickel Conservation Research Underway

Conservation of vitally-needed nickel and chromium in heat resistant castings is the objective of important research just announced by the Alloy Casting Institute of Mineola, New York. Conducted at the Battelle Memorial Institute, research has been concentrated on developing a heat resistant material of lower alloy content than the high nickel alloys frequently used in 900-1400°F service. From knowledge of the iron-chromium-nickel alloy system and field experience, casting metalurgists selected an alloy containing 21 per cent chromium and 9 per cent nickel, designated as the HF type, as the material most likely to provide the combination of strength and corrosion resistance required for "intermediate temperature" (900-1400°F) service. Tests to date indicate that this alloy offers a promising solution to the requirements of such service.

Detroit Diesel Passes 350,000 Mark

Detroit Diesel Engine Division's production of 2-cycle diesel engines has reached the 350,000 mark.

Mr. W. T. Crowe, general manager of the Division, said this figure marks a milestone in diesel engine production, because prior to 1939 when Detroit Diesel entered the field, the entire American diesel industry had produced only 60,000 engines.

NYC Receives 7 More Beeliners

Seven more rail diesel cars, known as Beeliners, went into service recently on the New York Central Railroad. Delivery of these self-propelled cars brought to 18 the number in operation on this road.

The cars have gone into operation between Jackson and Grand Rapids, Mich., between Syracuse and Buffalo, N. Y.; between Albany and Poughkeepsie, N. Y.; and between Springfield and Boston, Mass., where four cars will be placed in service.

In several instances, the Beeliners will provide additional service, while in others they will replace unprofitable steam trains and at the same time provide faster schedules.

DIESEL BRIEFS

State of New Jersey Loans GM Unit $12 Million

The General Motors Acceptance Corporation has arranged to borrow $12,000,000 for nine months from the State of New Jersey at 2½ per cent interest.

The transaction, consummated recently at the State House in Trenton, was said in financial circles to mark the first time that a state or other governmental body in the United States had entered the commercial paper market to lend public revenues pending the time when they would be required to be spent for purposes designated in the public budget.

The state's entry into the commercial paper market is permitted by a law recently enacted by the legislature.

American Brake Shoe Buys California Plant

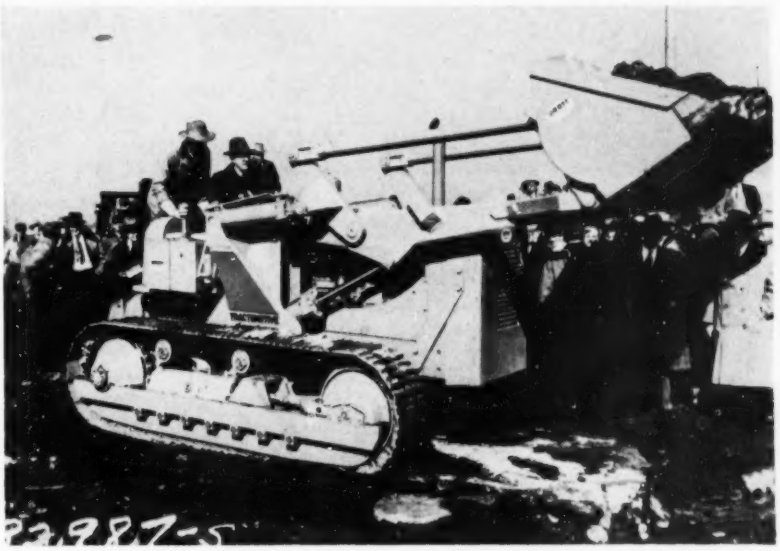
American Brake Shoe Company has purchased the plant and property formerly owned by the Jumbo Steel Company in Azusa, California. The property consists of approximately five acres of land and several buildings. The American Forge Division of Brake Shoe will use the plant to start a west coast steel forging operation. Machinery for upset and press forgings will be installed and it is expected operations will start about the middle of the year. American Forge now operates two forging plants in Chicago which are currently making various sizes of shell forgings for defense.

Gas Turbine Test Shows Promise

An experimental 500-hp. gas turbine is under construction at McGill University laboratories in Montreal to test the feasibility of a coal-fired gas turbine locomotive for Canadian railroads. Financed by a $125,000 federal grant, the unit is expected to be ready for operation next fall.

Object of the experiments, it is understood, is to produce an engine that will be able to operate on low grade bituminous coal of the type produced in Nova Scotia.

The prototype turbine being developed at McGill started mechanical tests with oil a few months ago and orders are now being placed with manufacturers for heat exchangers essential to the use of coal. The coal combustor is already under test.



Milwaukee Starts Expressway

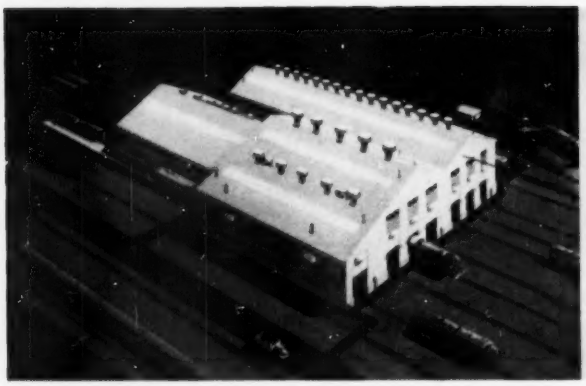
Expressways started to become a reality for Milwaukee after 10 years of planning and engineering preparation when ground was broken March 17 to mark the physical start of a system that will cost an estimated 100 million dollars when completed in 20 to 25 years.

Mayor Frank P. Zeidler took the first bite out of the ground on the 44th street leg with an Allis-Chalmers HD-9G tractor and front-end shovel. Instead of the traditional hand shovel, power equipment was used to typify the magnitude of this project which eventually will sweep through the center of Milwaukee and outward in all directions.

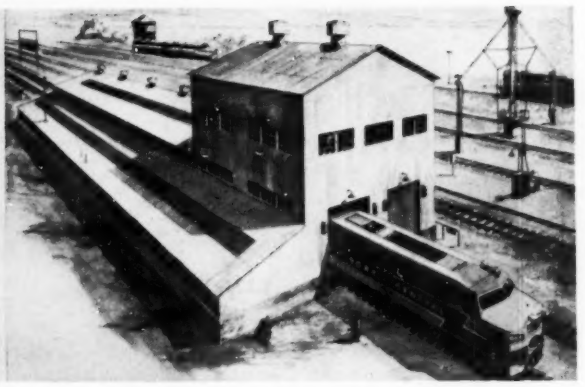
The contract for 1800 feet of preliminary work was awarded by the Wisconsin State Highway Commission to the Speedway Contracting Company and the Druml Company, Milwaukee. It amounts to $700,404.

These contractors will build the access underpass to the new Milwaukee County Stadium near where the ground-breaking ceremonies were held; three culverts; storm and sanitary sewers to drain the area and connect with the general sewer systems; move 168,000 cu. yd. of muck; and backfill the area with 150,000 cu. yd. of sand and gravel fill.

The way will be prepared for construction of an express roadway which will eventually be extended. It will be Wisconsin's first expressway.



Sketch of diesel service and repair shop being constructed at Minoa, N. Y., for the New York Central System.



Sketch of standard service and repair shop designed and erected by the Luria Engineering Corp.

Pre-Fab Locomotive Shop Facilities

Under today's conditions one problem confronting the railroads is that of providing, in a reasonable length of time, shops of the smaller sizes to care for units of their rapidly growing diesel locomotive fleet. One railroad has found that the use of available prefabricated building structure parts greatly expedited procurement and erection of the main building—at a lower cost.

AS the railroads' dieselization programs develop, numerous smaller diesel shops are needed. Local service on some main line divisions and all service on other divisions or sub-divisions composed of secondary and branch lines, including switching service in many small towns and cities, is rapidly becoming partly or wholly dieselized and swelling the need for these secondary facilities.

These shops are desirable and necessary for the following reasons: (1) to provide protection from cold or otherwise inclement weather, or from dirt and dust in the air, for periodic inspections, maintenance and repair work; (2) to provide protection for one or more units against cold and freezing when locomotives are used less than three tricks, or on lay-over time between trips or over weekends.

The larger diesel shops are usually located at terminals or other strategic spots, for servicing, inspection, maintenance and repairs to a considerable number of both passenger and freight locomotives, most of which are in through-road long-distance service. These shops are usually of rather expensive construction, each one especially designed for the particular location, or remodeled from existing steam locomotive shop facilities.

Pre-Fab Building Parts—One Solution

In the usual procedure a building is designed for a particular location. A contract is then let for the building's erection, the material for which may be either procured by the railroad or the contractor. Once the building is under way, countless problems and seemingly endless delays—all time consuming—invariably occur before completion. These all add to the final cost, which too frequently exceeds the original estimate.

Many of these problems, delays and high costs may be eliminated by a new concept introduced into the building industry—a complete line of prefabricated structures that offers all the cost and time saving advantages of standardization.

It may not be possible to adopt a complete standard prefabricated building for a diesel shop. It has, however, been found possible to provide a shop for this purpose by electing about 80 per cent of the material from standard prefabricated parts which may be taken from warehouse stock, or even from the production line.

That this may be done with considerable freedom of design and selection of materials for roof and wall covering has been evidenced by one large Eastern railroad.

New York Central Installations

FIRST DIESEL SHOP of this sort of construction was at Corning, N. Y., placed in service October 1950. It is 20 ft. by 80 ft. with one through track, with a 4-ft. deep pit between rails. There is an 18-ft. width lean-to addition on one side to provide office, storeroom, and various other service rooms. The facilities here do not include a drop table or elevated platforms along side of the shop track, but do include one jib crane.

SECOND SHOP STRUCTURE, installed at Rochester, N. Y., was completed last summer and was recently placed in operation. It is 40 ft. by 120 ft. with 22 ft. eave height, and has two through tracks, with a pit between the rails and a depressed floor under the track area. An 18-ft. wide lean-to addition is provided on each side of

building, for offices, storeroom, workroom and various service rooms. As at Corning the facilities do not provide for a drop table or for elevated platforms along side of tracks. A jib crane has been provided to speed-up service operation.

THIRD SHOP being built at Watertown, N. Y. is nearing completion, and is expected to be ready for operation this spring. It is 40 ft. by 140 ft. with two through tracks, and 3-ft. depth pits between rails, and depressed floor under track area. There will be a 15-ton overhead crane running the length of two bays, for approximately 40 ft. Six locomotives may be serviced in this shop at one time. A drop table at one end of the shop will serve both tracks. No elevated platforms are provided along sides of tracks.

FOURTH SHOP in this series on the New York Central will be at Minoa, N. Y. (East Syracuse). Construction of this shop began the early part of this year, is scheduled for completion during the summer, and is to be in operation this autumn. It will be 76 ft. by 243 ft., with three through tracks and three stub end tracks in an adjoining portion of the building. This adjoining portion will be approximately 143 ft. long and 80 ft. wide for placing units requiring heavier repairs. The three stub-end tracks will be served by a 30-ton capacity overhead crane, while the three through tracks will have a 5-ton overhead crane.

A 160-ft. length of the portion of building back of the three stub-end tracks is composed of three floors to be used for offices, storerooms, lube oil test room, filter cleaning room, fuel and lube oil pumps, space for boiler, compressor, switchboard and foam room.

All six tracks will have a typical arrangement of elevated platforms along side of tracks with depressed floors in that area and pits between the rails. An addition to the main building near the end on one side will house a wheel truing machine, on which wheel treads may be brought back to standard contour without removing wheels from the truck. This addition is 143 ft. long and 39 ft. wide and is located on a through track along one side of the shop.

New York Central System diesel service shop at Rochester, N. Y., under construction. This was the second shop of this type built by the NYC.

This road now has 1385 diesel-electric locomotive units in service, 479 additional units on order as of January 1, 1952, which if received as now expected (by February 1953) will make a grand total of 1864 units.

To service, maintain and repair this large diesel fleet of locomotives, close to the largest number on any one railroad in the United States, the Central already has in operation other diesel shops including facilities located at Springfield, Mass., Harmon, N. Y., Cleveland, Ashtabula and the Stanley yard in Ohio, and contemplates building additional shops at Detroit, Mich., Elkhart and Indianapolis, Indiana.

The steel structures of the shops cited in this article are fabricated by the Luria Engineering Company in their Bethlehem, Pa. plant. Building erection was also by this firm. The Luria company designs and builds many types of steel frame structures for general industry.

Advantages of Pre-Fabs

Some of the advantages claimed for erection of building from standard pre-fabricated parts are:

Rugged Permanent Construction — parts fabricated from heavy rolled steel with building designed to the most exacting building codes.

Maximum Flexibility—wide range of standard sizes and types offered, which can be combined in almost any desired arrangement, with practically unlimited choice of collateral materials. Roofs and walls can be selected from low-cost corrugated galvanized steel sheets to masonry walls and built-up roof. (New York Central shop walls and roof are of corrugated transite and 2-in. thick Celetex-Cemesto. This combination is said to have an insulation value at least equal to a brick wall of five or six times this thickness.)

Greater Availability—a large inventory maintained of completely fabricated buildings, many sizes available for immediate shipment from stock.

Fast Economical Erection—field connections are designed for bolting. Welding or riveting is not required on standard buildings, but may be employed if customer desires. This was done in the case of the New York Central.

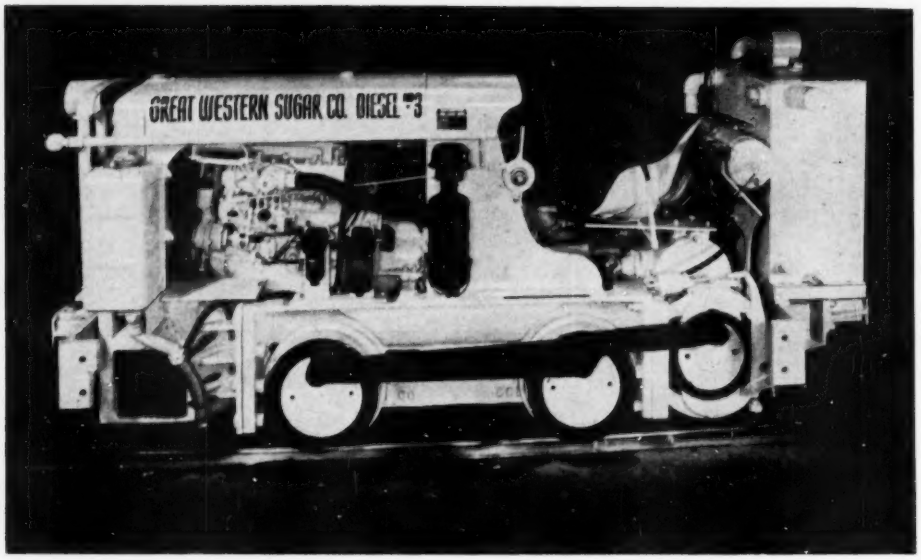
More Usable Building Space—rigid frame construction gives unobstructed head room all the way to the rafters.

Lower-Over-All Cost—substantial savings result in cost of these standardized prefabricated building parts, cost of erection and maintenance expense.

Summary

The rapid dieselization of the nation's railroads has created an immediate need for shop facilities to properly care for this new equipment. Erection of these required buildings by conventional methods would prove too costly and time consuming, particularly for facilities for the secondary type.

Building of shop facilities from standard pre-fabricated parts has shown that highly satisfactory buildings can be produced expeditiously and at greatly reduced costs.



A 5-ton Ruth diesel mine locomotive with exhaust gas conditioner. Power is by an 80-hp. Hercules engine through a 4-speed transmission, and a fluid coupling.

Conditioning Diesel Exhaust Gases for Mine Locomotives

Diesel Locomotives for Mines?
U. S. Bureau of Mines says "Yes"
United Mine Workers say "No"
What's the story, Mr. Lewis? The fact is that diesel mine locomotives are being currently and successfully used in mining operations in Canada and abroad. Here is one way to make exhaust gases safe.

DIESEL engine exhaust contains toxic and noxious gases such as oxides of nitrogen, carbon monoxide and aldehydes that must be substantially removed before the machine can be operated in confined places. Also provision must be made for the elimination of any sparks that might cause ignition of mine gases or coal dust which could result in an explosion.

To these ends an exhaust gas conditioner has been developed and with proper care and maintenance will easily permit the application of diesel power to mining operations. Not only are the advantages of this type of power thus made available to the mining industry, but the dangers from high voltage lines running through confined spaces, which have often electrocuted personnel and sparks from which have set off explosions with mine gas and coal dust are eliminated.

What's in the Conditioner

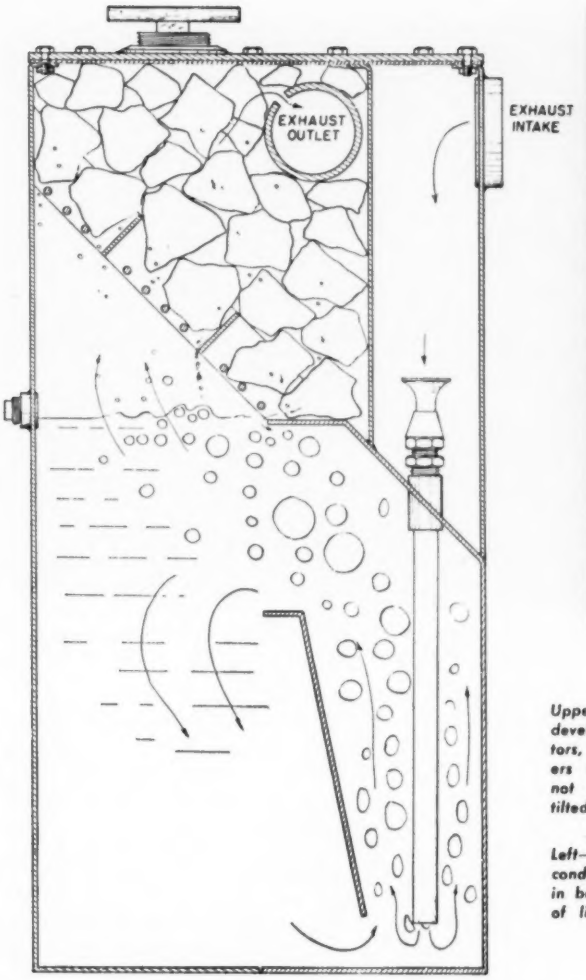
The exhaust conditioner, shown in the accompanying illustration, operates on the air lift principle, which depends on the fact that a column of liquid with exhaust gas discharging through it is lighter than the column without gas.

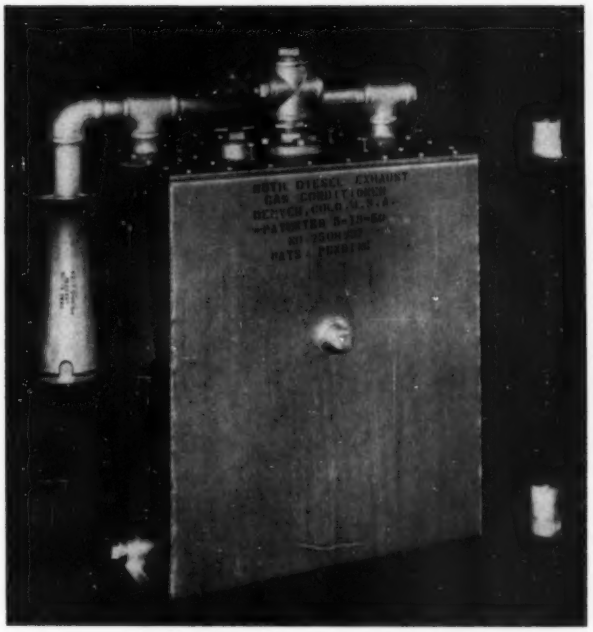
This unbalance causes rapid and violent circulation of the conditioner liquid, which gives the exhaust high liquid gas contact which is necessary for the adsorption of the aldehydes that are water soluble. The circulation is effected at the expense of engine back-pressure and consumes about 1 per cent of engine horsepower. This conditioner imposes less than 1½ in. of mercury back pressure, which is considerably under the maximum of 3 in. of mercury permitted by most engine manufacturers.

Water level of the conditioner is determined by the overflow plug in front of the conditioner. When filled with cold water the hot exhaust will expand the water causing the surplus to discharge from the tank and reach the correct level corresponding with the work the engine is doing.

Above the water level is a stainless steel tray that holds limerock (calcium carbonate) briquets. These briquets remove the mechanically entrained water from the exhaust and permit the gases to expand in the interstices. As the briquets are wet at all times with the liquid of the conditioner, a relatively large surface of conditioner liquid is exposed to the exhaust gas.

Since the briquets are of a chemical composition, they also serve the purpose of neutralizing the acids and aldehydes that have been absorbed by the liquid. The tray of briquets will last several months, but should be





Upper right—new conditioner developed for use on tractors, bulldozers, shovel loaders and diesel trucks, will not blow out water when tilted at steep angles.

Left—cross-section of exhaust conditioner showing water in bottom of tank with tray of limerock briquets above.

watched carefully and replaced when needed. Water in the conditioner normally has a pH of 3 without the briquets, and about 6 with, which is almost neutral.

How It Works

The functional operation of the Ruth exhaust conditioner is based on the solubility of gases in water. The deleterious gases formed in a diesel engine are acid and hydroscopic, as for example the noxious oxides of nitrogen, which go into solution very rapidly, forming nitrous and nitric acids.

However, hot water dissolves much less gas than cold water, and the water in the conditioner is always hot when it is in operation. The saturation point of these gases is, therefore, reached very quickly in operation. Were it not for the limerock (calciumcarbonate) neutralizing the nitrous and nitric acids to calcium nitrate and calcium nitrite, the water would soon fail to take these gases into solution. The large amount of these salts found in solution shows the effectiveness of the conditioner.

It is well known that hydrocarbons and oxygen under high pressure and a catalytic agent form phenols, aldehydes and formaldehydes synthetically. It is to be expected that diesel engine exhaust would therefore contain these gases. They are not toxic but are highly irritating to the eyes, nose, throat and lungs.

These gases are soluble in water. When they are violently agitated and thoroughly diffused in sufficient volume of water, they go into solution. When the water is in contact with the lime rock they are neutralized to a large extent.

Also, oils and waxes issuing from the engine are saponified or cut by the calcium salts in the conditioner, making them soluble in the conditioner water.

The conditioner will also remove some of the free carbon or smoke which is later either discharged as a froth or kept in suspension in the conditioner water until drained.

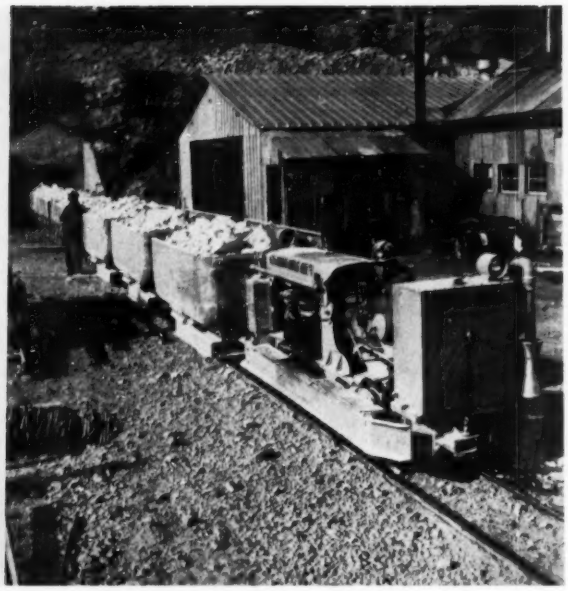
Finally, as the conditioner exhaust issues from the conditioner, it passes through a venturi jet shrouding the conditioner exhaust and automatically dilutes the exhaust with five parts of mine air before personnel in the vicinity have an opportunity to breathe it.

About Smoking

In addition to the functions mentioned, the water performs the additional valuable function of dropping the temperature of the engine exhaust. This particular exhaust conditioner will drop the exhaust gas temperature from approximately 1200° F as it issues from the combustion chamber to not over 120° F as it leaves the conditioner to the mine air. At this temperature, there is little, if any, chemical action of the diesel exhaust with the free oxygen and nitrogen present in the atmosphere.

The drop in exhaust temperature is effected by the solution in the conditioner which absorbs 960 Btu's of

Former storage battery locomotive converted to diesel electric power by Caterpillar D-4 diesel connected to 20-kw. generator.



A 5-ton Ruth diesel hauling 9 loaded cars with a gross weight of 8 tons. Locomotive can develop 4400 lb. tractive effort.

heat for each pound of water evaporated. Exhaust from the conditioner which issues under heavy load is virtually steam. This flocculates or precipitates the smoke or carbon particles that exist in the coloidal state in raw diesel exhaust.

Since smoking is generally the result of an overloaded engine, it is best prevented by using an engine about 25 per cent larger than the load requires. It is especially important that diesel engines used on mine locomotives have a combustion chamber that provides sufficient turbulence to throughly mix the oxygen with the fuel at the instant of injection which eliminates free carbon or smoke from the exhaust when not overloaded.

Diesel exhaust that cleans up best in the conditioner comes from engines with injection pumps set to develop maximum power. This is also the point of the most perfect combustion. The correct chemical combining weight of fuel and air is 1 lb. of fuel to 14.5 lb. of air, but since the co-mingling of fuel and air is somewhat of a hit and miss proposition, an excess of air is necessary to get substantially complete combustion. In a diesel engine the fuel air ratio will vary from 14.5 to 22 to 1 at full load and up to 80 to 1 at no load. A higher fuel air ratio than 22 to 1 will increase proportionately the aldehydes and decrease the horsepower.

Maintenance

Water in the conditioner should be changed at least once every eight hours of operation to prevent the building up of the above salts in the conditioner water, which would lower its absorbing efficiency.

Servicing the conditioner consists of removing the top at least once every thirty days of operation and replenishing the limerock bed with 2-in. mesh and minus 3-in. mesh limerock for that which has been consumed by the acid diesel exhaust gases. Limerock used is calcite and not dolomitic.

At least once every fifty hours, the pipe plugs above the injector tubes should be removed and the tubes rodded out with a wire brush. This operation should be performed while the conditioner is hot and with the water up to the running level. A piece of wood, the shape of the flared top of the injection tubes, is used to clean off the carbon soot which accumulates at this point.

In the advent the locomotives starts to smoke there are two things to investigate. First inspect the injection tubes to see whether they are dirty, which would of course cause excessive back pressure. Second, the air cleaner screen may be plugged by the humidity and dust which accumulates very rapidly in mining operations. The primary air cleaner screen should be given special attention.

Summary

Diesel engine exhaust incontrovertibly contains toxic and noxious gases such as oxides of nitrogen, carbon monoxide, and aldehydes. These gases should be removed by a proper exhaust conditioner regardless of the amount of ventilation in the mine, as workmen should never be permitted to breathe untreated diesel exhaust gases.

The Ruth conditioner removes from 60 to 90 per cent of the toxic and noxious gases and substantially all of the lubricating oil in diesel exhaust by the alkalinity maintained by the limerock.

Conditioner exhaust is diluted with five parts of mine air before any person in the immediate vicinity has an opportunity to breathe any part of it by means of a venturi shrouding the conditioner exhaust.

Diesels can be used successfully in all mining operations. The equipment is available. There is no reason why the advantages of deisel power cannot be applied in this country as they have been in Canada and abroad.

Diesel powered military road switcher of 1600-hp. Locomotive was designed and built by Electro-Motive Division of GM. to operate under a wide range of conditions.

Army Transportation Corps gets . . . . . .

A Flexible Road Switcher

"I WANT you to tool up so that you can do all kinds of boat repair including complete rebuilding."

"Yes, General. Now, what kind of boats, how big, where are we to operate, and what are the conditions?"

"I don't know, but you just have the tools to fix them," was the reply.

This conversation took place during the formative days of the Amphibian Engineers and the writer was the fellow with the problem. It typifies the sort of thing that continually faces the Military. Planning, taking into account all of the known and estimated contingencies, is the only logical solution.

Take the Transportation Corps, for example. One phase of their operation is railroading. They could conceivably operate in any or all parts of the world. Think of the varieties of roadbeds, rails, gauges, bridge and tunnel restrictions that could be encountered. Also, for maximum effectiveness T. C. units must be integrated with widely diversified local equipment.

Correlation of all the data regarding technical requirements of the major railroad systems throughout the world is the first step. From this, specifications can be drawn for a unit with the greatest degree of flexibility to meet the highest percentage of the requirements.

This is exactly what was done. Specifications were furnished by the Transportation Corps to the Electro-Motive Division of General Motors. The result was a new type of locomotive known as the Military Road Switcher 1.

What Can I Do?

First of all, the MRS-1 is adaptable to a variety of both physical and operational requirements. It is intended for any class of operation—switcher, passenger or freight — and was designed to achieve the same results as would be obtained from standard U. S. freight or road switchers within the track load limits of Europe.

Further, it was arranged for multiple operation with other locomotives of the same general characteristics, regardless of the builder, which the T.C. now possesses or has on order.

It can be operated successfully in temperatures ranging from —40° F to 125° F. In common with other GM locomotives it will function regularly on the lowest grade of diesel fuel normally available. This means fuels with as low as a 40 cetane rating and in emergencies, even lower grades can be used.

In view of the intended service, controls were simplified to enable engineers having any previous experience with steam, electric or diesel motive-power, to operate the locomotive without danger of damage to foreign lightweight rolling stock in spite of the unusually high tractive effort that can be developed.

While the total weight is about the same standard locomotives of the same horsepower rating, distribution of weight over six axles instead of four improves adhesion. Dependable adhesion on good dry rails at full horsepower is 23 per cent, while starting tractive effort on good dry rails is 30 per cent.

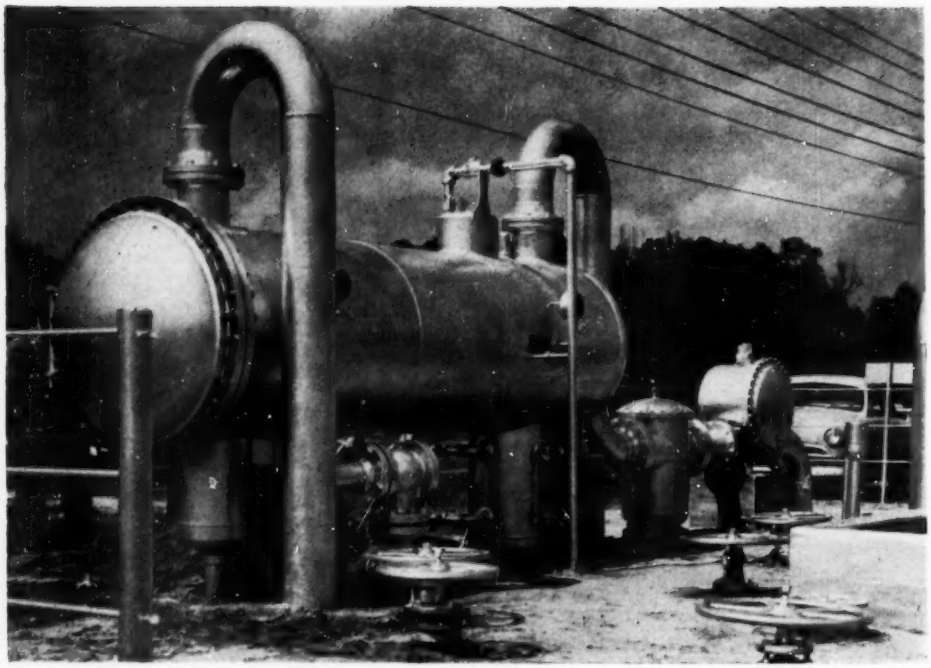
The Transportation Corps set a limit of 41,000 lb. per axle whereas 60,000 lb. is entirely permissable for domestic locomotives. The weight limitations, in spite of the additional machinery carried, was met by weight reductions in car bodies, truck frames and an entirely new design of a 6-wheel, 3-motor truck.

Thus, the inherent advantages of American motive power—longer trains and faster speeds—are translated to fit into foreign requirements.

Machinery Used

Power is supplied by a GM 16-567B diesel with input to the generator rated at 1600 hp. The D-12 generator, common to GM freight locomotives, is used with a D-14 alternator. A total of six, three per truck, D-27 traction motors do the axle driving.

(*Continued on page* 72)



One type of separator installed to remove water and pipe scale from products pipe line before entering displacement meter.

Continuous Dehydration of Fuel

ENGINES do not take very kindly to a diet of contaminated fuel oil. Most contaminants fall into the categories of dirt and water, both of which are particularly destructive to injection equipment and harmful if they get as far as the cylinder.

From the time that fuel oil leaves the refinery it is vulnerable to contamination. Most of this is the result of handling and storage. Contaminants in tanks, tank cars or trucks, tanker compartments, pumps and hoses all add to the accumulation. In the case of water, we have the additional effect of condensation in all of the various containers.

All of this can be minimized by care in handling and this is well worth the effort. Just to make sure, however, the fuel oil should be cleaned on its final trip to the engine. Outdoor storage tanks will add their contribution in the form of rust, tank scale, sludges and water from condensation and in the case of underground tanks, actual leaks.

The Problem

Strainers and filters do a good job of taking out the solid contaminants and in some cases part of the water. Water is tougher to remove and in addition to interfering with the combustion process is abrasive and will cut minute orifices quite badly and rapidly. Water removal, then, is the major problem.

This problem is not peculiar to the diesel field, but confronts users and handlers of all of the liquid fuels. Pipelines, tank farms, truck loading racks, fueling trucks, drum filling plants, tankers, aircraft fueling facilities, and many similar activities both civilian and military have been faced with this problem.

Separation One Answer

Considerable interest and engineering attention has been focused on means of separating water from fuels on a continuous basis, unattended, and at minimum cost, both for installation and operation. Such efforts have paid off and such units are not only now available, but in widespread use in a variety of applications.

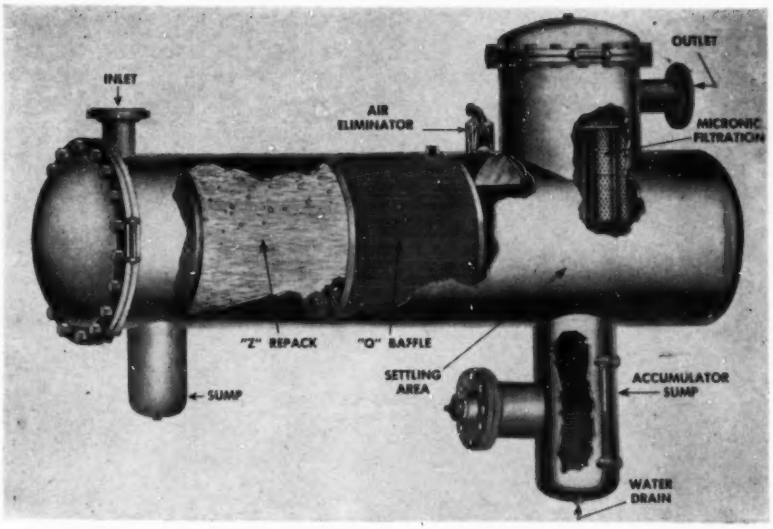
One of the best known and widely used of these separators is that produced by the Warner Lewis Company and its principles of operation and application will be described. The units are built as separators or in combination with filters to do the whole fuel-conditioning job. Various sizes provide from 5 to 2000 gpm. flow rates.

How It Works

Take a look at the illustration. The fuel enters at the top and must change direction to enter the first stage. Here, some immediate gravity separation of solids and water takes place and a sump is provided to catch the contaminants for later blow-down.

Fuel then enters the "Z" repack which is a pre-packed replaceable cartridge of excelsior. The excelsior has previously been treated to remove some of the natural wood resins that might otherwise be dissolved and entrained with the fuel. Coalescence of the water takes place on the wood fibers and the drops increase in size until their weight causes a tendency to settle out by gravity.

Since there is flow velocity, the water droplets will not settle vertically



Cutaway view of combination separator, filter, and air eliminator. Various units provide flow rates from 5 to 2000 gpm.

but will have a form of "trajectory". The rate of descent will, of course, depend on the flow rate and the friction encountered in passing through the fuel. The latter is largely a function of viscosity of the fuel. This brings us to the "Q" baffle.

If the drops are required to pass through a fairly thick layer of fuel (as those near the top of the stream), they may still be in the flow stream at the end of the excelsior element. Thus, for complete separation at this point, the flow rate would have to be reduced to permit sumping in the given amount of time at a given fuel viscosity, or the length of the element extended.

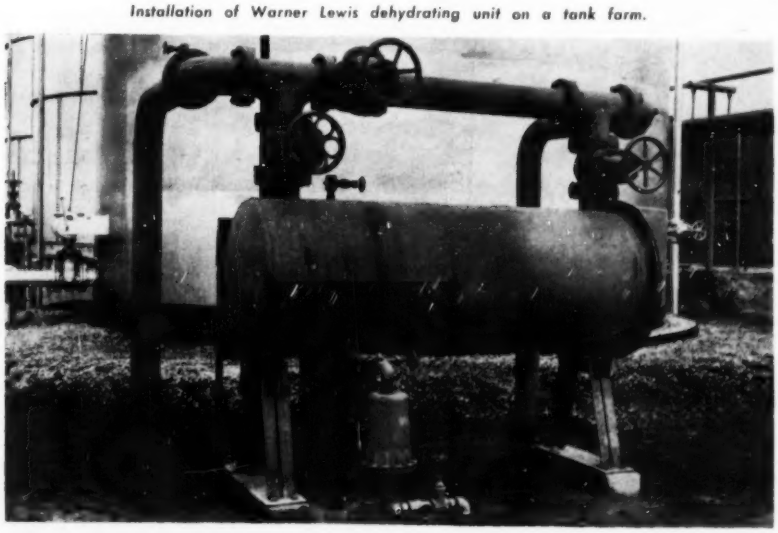
Since this is impractical, resort is made to a principle used in centrifugal purification to good advantage, that of reducing the thickness of the layer of fuel to be traversed. In one case, the layer is minimized by the use of a long tubular bowl and in another, a series of closely spaced and angularly placed discs separate the fuel into several thin layers.

The latter is the principle used in the "Q" baffle. A series of horizontal trays separate the stream into thin layers and a drop of water must only travel a short distance through the fuel oil before it reaches a plate that guides it out of the stream.

Viscosity of the oil is an important consideration; the lower the better. Just as in centrifuges, heating of the fuel oil (100-180° F depending on the original viscosity of the fuel) to lower the viscosity is beneficial and as the initial viscosity goes up as heavier oils are used, heating is essential to achieve results.

Water separated from the fuel oil flows to an accumulator sump from which it can be removed in a number of ways. Manual draining is the simplest, but various types of automatic water level control can be arranged to fit the needs of the application.

Installation of Warner Lewis dehydrating unit on a tank farm.



Filtration

Filters of the micronic type may or may not be incorporated in the unit. There is much to be said for their inclusion. In the first place, they are necessary in any system. Secondly, the combination unit tends to increase filter element life. Although the pressure drop across the excelsior repack is low, it will remove most of the larger particles (40 to 60 microns) and a good deal of the finer ones through a viscous impingement process. Its high dirt-holding capacity permits considerable accumulation without appreciable pressure build-up, thus relieving the dirt load on the micronic filters.

Other Features

In addition to the provisions for ejecting the water and dirt from the accumulation sump, other devices and indicators are used. A sight glass shows the level of the water in the sump and an automatic valve vents air accumulations. A gauge with a 2-way valve permits pressure readings before and after the micronic filters so that pressure drop and, thus, need for changing elements can be determined.

These units have proved extremely useful and practical. They have been widely applied and meet the requirements for handling all liquid fuels under all JAN and MIL Specifications. For diesel fuel oil application it is important that the viscosity factor be fully recognized and that viscosity be lowered to the maximum practical limits to facilitate separation.

1 *Apply brakes until bowl has stopped. Remove covers, lock bowl in frame, loosen coupling ring and remove.*

2 *Remove bowl top next, leaving bowl in frame. Then remove tubular shaft and discs as unit and place in solvent.*

3 *Scrape bowl shell with scoop to loosen and remove dirt that has been collected against the periphery.*

Cleaning a Bowl

FIFTEEN minutes of a De Laval oil purifier's operating time is all you need to put the machine into clean-bowl condition. And those 15 minutes allow for stopping the machine and bringing it back up to speed once the bowl is clean.

How to do so profitable a task in so short a time? Just follow the simple, 6-step procedure illustrated on these pages.

Note that this bowl-cleaning operation takes advantage of the fact that, except under special circumstances, the discs can be cleaned while they are still on the tubular shaft over which they fit. This can be done by immersing shaft and discs into a solvent such as gasoline, kerosene or any other light oil.

Simple immersion, without the necessity of any "pumping action" is sufficient to loosen the dirt on the discs. The discs must be cleaned individually only when dirt has been allowed to dry on them while the rest of the machine is clean. Then, the solvent is ineffective.

When the discs are taken from the solvent and

4 *Replace discs, wet with solvent, in the bowl. The solvent will have removed most of the dirt from the discs.*

5 *Reassemble the bowl and start machine without any oil. Run it "dry" for about five minutes.*

6 *Centrifugal force will throw remaining dirt from the discs. Seal with water as usual and turn on oil flow.*

in 15 Minutes or Less

returned to the bowl, the loosened dirt will be thrown off by centrifugal force once the machine is brought up to speed.

When a De Laval machine is used as a clarifier and a straight-side wall model bowl is employed, another simple practice will contribute much to swift, efficient cleaning. All it consists of is giving the bowl a lining which will catch dirt.

A kraft-paper lining is placed within the bowl shell against its outer periphery and secured at the top of the bowl by scotch tape. There is no need to hold the paper in place at the bowl's bottom. Centrifugal force will do the job when the bowl is spun.

All the solid impurities in a liquid will be packed against the paper as the machine operates. By inserting a putty knife between the bowl shell and the paper, the whole mass of paper and dirt may be scraped loose and removed as a single unit. The use of a lining is most valuable when oils containing a great deal of solid impurities are being cleaned.

NO. _____ OPERATIONAL RECORD

Date	DRIVERS	Trailer No.	FROM	TO	Trailer No.	TO	Trailer No.	TO	Trailer No.	TO	Trailer No.	TO	Weight	Weight	Weight	Miles	Date

Operational record, slightly condensed, shown across this and next page is one reason why tractor-trailer combination at left stays on the road so much. Good operation starts with maintenance; maintenance starts with good records.

Cutting Trucking Costs with Diesels

Gallagher Transfer Company used diesel tractors on mountainous routes; gasoline tractors on flat-country runs. Result? Total equipment operating costs per mile: For diesel — 8.9 cents; for gasoline engines — 10.5 cents.

IF you are going to make money in the trucking industry, you must first get a firm grasp on the major factors involved. Let's list them:

1. *Choice of equipment*
2. *Operating policies, including training and control of drivers*
3. *Sound maintenance policies*

Of course, the discussion here concerns the operating end of the business. You have to have customers, too.

Let's take the Gallagher Transfer Company and see how they stack up and what results they are getting. They were organized in Denver in 1932 as a newspaper delivery service. Since then, routes and mileages have been consistently expanded until now, they are common carriers hauling general freight. A subsidiary, the Gallagher Transportation Company, hauls machinery, heavy equipment and other similar contract jobs. They once moved a 25-ton steel airplane hangar.

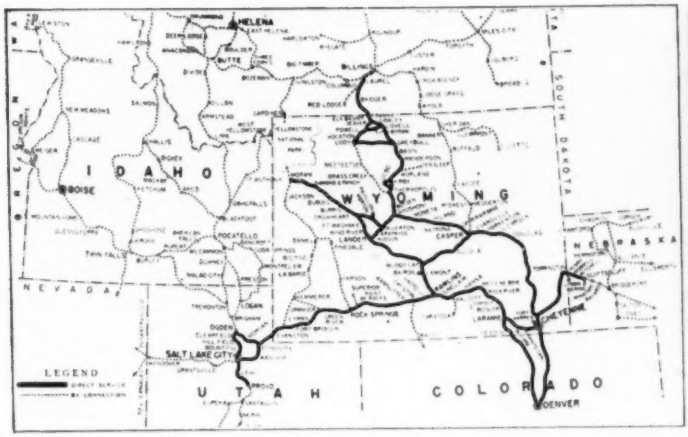
The entire operation has shown a profit every month since their organization, and it is said that they have one of the best profit-to-revenue dollar ratios of all inter-state truckers. Records like this don't just "happen", so let's look further.

What of Equipment?

Both diesel and gasoline engine-powered tractors are operated, although all of the heavy over-the-road tractors are now diesel-powered. These are Mack LJT units and there are 24 of them, plus two similar units used for heavy hauling work by the Gallagher Transportation Company. There are also 23 smaller tractors still using gasoline engines.

MONTH OF _____ TRUCK NO. _____

FUEL USED						Oil Used	Station	REMARKS	Date	LABOR	LABOR Hr	LABOR Ad	Date	PARTS MATERIAL	PURCHASED FROM	COST Material	COST Labor	TIRES AND TUBES
Gallons	Gallons	Gallons	Gallons	Miles	Gallons													



Routes and mileages have expanded from newspaper delivery service to those shown above. With this growth, Gallagher has been hard put to provide adequate maintenance space. Portion of shop is shown at right.

The original company and the subsidiary have both standardized on the 200-hp. Model NHB-600 Cummins diesels. This is smart operation, when possible, to simplify shop operations and to reduce the necessary inventory items in the stock room.

The first three Cummins engines were installed in the Mack LJT's in 1948, replacing 196-hp. gasoline engines. During the next two years, 12 more tractors were converted. Seven new Macks with the Cummins engines were put into service in the first half of 1951 and the remaining two were recently installed in the fleet.

All of the Cummins-powered Model LJT Mack tractors are 6-wheelers with the following equipment:

Transmission	*Mack*, 10-*speed*
Clutch	*Mack*, *CL*-28
Rear Axle	*Mack*, *SW*-451
Rear Axle Ratio	7.32
Tire Size	10.00 x 22

These units usually haul 33,000 to 40,000 lb. payloads on 45-ft. trailers.

Now, Operating Policies

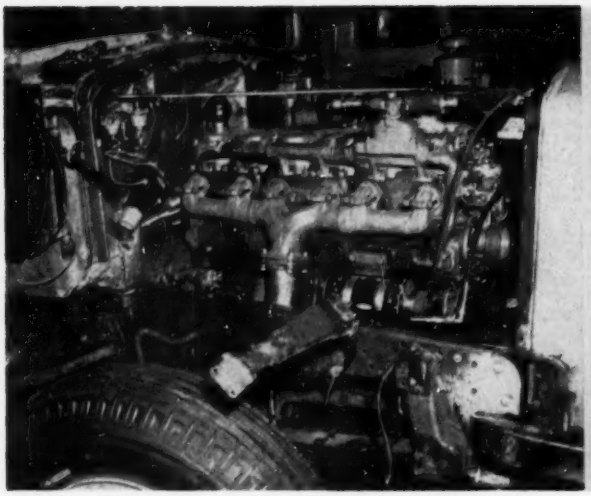
Utilization of equipment is important and perhaps one of the best tributes to the diesels is that during the conversion period they were assigned the tough mountain routes from Denver to Salt Lake City; Denver to Cody, Wyoming; and Denver to Billings, Montana. The 196-hp. gasoline-powered Macks were operated on easier flat-country routes from Denver to Scottsbluff, Nebraska; and Denver to Casper, Wyoming.

Method of operation on these runs was also given attention. In an attempt to insure mature judgment on the part of drivers, rules specify that they must be at least 30 years old. They are trained to utilize the gear shifts properly so that the engines are always at or near the point of optimum efficiency. Over-the-road speeds are limited to 45 mph. These factors have resulted in safer driving habits and a low accident rate.

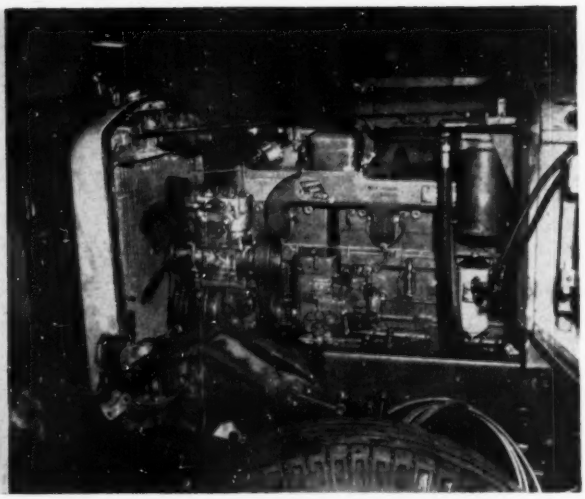
There is another influence in getting more efficient operation and better maintenance of equipment. It involves a profit sharing plan started several years ago and to explain this we'll let James E. Jones, equipment superintendent tell you in his own words.

"We believe that our profit sharing plan is a large factor in efficient operations. In my experience with diesel engines in this company and other companies, the large fault is not so much in the engine as in not having proper driver control. When alone on the road, the driver may drive as suits his fancy, which often is certainly not what is best for the equipment he is handling.

"This applies to the mechanics, too, who sometimes get careless or try ideas that are not in keeping with good engine maintenance procedures. The profit sharing plan has the effect of putting a supervisor with each driver and mechanic. As a result we do not have most of the daily damage caused by carelessness so often found in a company of this size."



With some of the units over the 400,000-mile mark, none of the Cummins diesel engines have as yet been removed from the chassis for complete overhaul.



Both sides of an engine are shown as exposed for maintenance work when, cowlings, fenders, etc., have been stripped off. Ready access facilitates good repairs.

Let's Look at Maintenance

Planned maintenance must start with accurate records. A daily record for each tractor is maintained. Among the items covered are: Drivers; trailer numbers; originating point and destination; weights (total and weights per axle); miles; fuel used; lube oil used; repair labor in hr.; parts; material costs, labor cost; and tire and tube costs.

With such complete records it is possible to put the finger on causes of out-of-line costs and correct the trouble. They also permit detailed analysis of operating costs and factual evaluation of equipment.

From the maintenance point of view, the operational data plus the history of engine repairs is a guide to the effectiveness of the inspection and servicing schedule. It also permits a check on the quality of the fuels and lubricants used.

Emphasis, here, must be placed on the schedules of preventive maintenance and routine work, since nine of the oldest Cummins engines have operated over 340,000 miles without being out of the truck chassis for major overhauls. Five units have passed 400,000 miles and considerable additional mileage is expected as the engines are all operating satisfactorily.

Results are the Pay-off

In the period between 1948 when the first diesels were installed and June 30, 1951, 22 of the Mack tractors on the mountain routes piled up 3,843,135 miles at a total equipment operating cost of 8.9 cents per mile. The 196-hp. gasoline engine-powered Macks, operating on the easier flat-country routes, averaged 10.5 cents per mile.

In figuring these costs, Gallagher includes all cost items: insurance; taxes; depreciation; tire costs; mechanics' wages; shop supervisory salaries; clerical costs for maintenance of equipment records, etc. Excluded are drivers' wages.

A summary of the fuel costs for diesel operation since 1948 shows:

Total miles for diesel tractors	3,843,135
Total fuel used, gal.	875,343
Miles per gal.	4.39
Total fuel cost	$150,764.34
Fuel cost per mile	$0.039

The gasoline engine-powered units on easier routes ran only 3.22 mpg. with an average fuel cost of $0.063. This was the average of over 2½ million miles of operation since 1946.

Maintenance costs for the period of diesel operation came to $145,924.71 which, divided by the mileage, comes out to $0.038 per mile. This figure includes all parts and labor on tractors and trailers, insurance, taxes, depreciation, and all supervisory and clerical costs tied in with the equipment and shop. Tire costs are excluded. The supervisory and clerical costs are apportioned on a mileage basis for each tractor.

This method of accounting for all the various cost items is realistic and presents a true picture of the cost for owning and operating the tractors.

In view of this operational breakdown, it will be very surprising if Gallagher doesn't stick with diesels and expand their use. Given the opportunity, by conscientious observance of the factors mentioned earlier, the inherent advantages of diesels will come through.

Some Things to Know About—

Picking Mufflers

by H. A. Wiedenman and M. D. Pugh*

Left—cut away view of spark arrester-silencer showing impeller and arrangement of louvres. Right—cut away of louvre-absorption type muffler showing center baffle and inner shell with louvres. Exhaust enters at bottom in both cases.

ALMOST everyone, if asked the purpose of a muffler or silencer, would answer, "To eliminate noise." That is true in the broad sense, but technically it is to reduce or smooth out the pulsating flow which is the *cause* of the noise. This would not, in itself, offer any very difficult problem, but since it must be applied to the exhaust of the engine, it must be accomplished with practically no loss in engine efficiency through back-pressure.

Nature of the Problem

The exhaust system comprises an acoustic flow that has been shock-excited into oscillation by the alternate opening of the exhaust valves. When confined within a length of straight pipe, these oscillations behave like water in a cloudburst, which follows the line of least resistance and concentrates in a ravine or gully where high wave fronts develop. Wave fronts such as this occur in an exhaust system, and if allowed to escape to the atmosphere unimpeded, they produce the worst type of exhaust noise and, in many cases, also prevent the normal operation of the engine.

**President, Kittell Muffler and Engineering Co.*

The hot charge of gas on being ejected from the cylinder leaps into the pipe much like a coil spring suddenly released. The exhaust valve then closes, and the body of the gas traveling at a high rate of speed behaves like the spring, in that it tends to over-extend itself by stretching out to greater than its normal length. The resulting state of flow is then a series of compressions, equally spaced along the pipe, with low pressure areas separating them.

The head of the compressions or wave fronts develops a more abrupt pattern the farther they are forced to travel before they reach the atmosphere. This effect is readily noticed when a long length of straight pipe is attached, without a silencer, to the exhaust of an engine. The loud cracking report is caused by the abrupt wave front expanding as it leaves the confining walls of the pipe and escapes to the atmosphere.

As this compression leaves the end of the pipe, the atmosphere, in turn, reenters the exhaust pipe with considerable velocity and continues back toward the engine until it collides head-on with the next wave front; has its direction reversed; and is pushed out of the pipe.

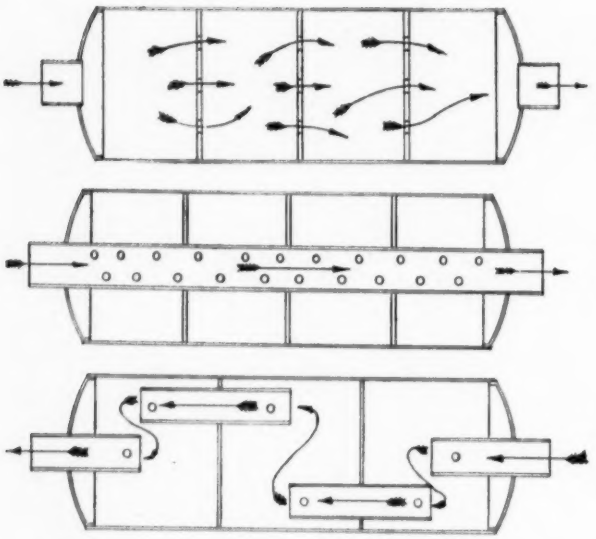
It is not unusual for this effect, called "ramming", to have detrimental effects on the engine such as increased temperatures, sticking and burning of exhaust valves, and loss of power output. Adequate silencing and elimination of ramming in such a pulsating flow must be done in a manner that will not duplicate these detrimental effects through restriction of the exhaust gas flow.

Muffler Types

There are five general types of mufflers offered, each having certain advantages and the purchaser, whether the actual owner, the consulting engineer or the engine manufacturer, must evaluate the advantages of each when selecting the type best suited for the engine and service required.

Baffle—This type consists of a series of baffles containing various types of holes. These baffles are generally placed at right angle to the flow of the exhaust gas. The advantage of this type is low cost construction and is the type most generally used with small engines.

Absorption or Resonator—In this type, the exhaust gas goes straight through



Baffle type muffler. Has the advantage of low cost construction and is common on small engines.

Resonant type muffler. This type causes little or no back pressure.

Off-Set Tube type muffler. Fairly good for avoiding excessive back pressure and is relatively cheap to make.

a pipe which has staggered openings. The sound waves are attenuated in the baffling chamber surrounding the pipe. The staggered arrangement of the openings in the pipe provide wider frequency attenuation. Such mufflers cause little or no back pressure. They are generally used where high frequency sound waves are to be attenuated.

Off-Set Tube—This type is of simple construction and is relatively low in cost. It is, in general, a good silencer and is fairly good for avoiding the creation of back-pressure.

Three-Pass Tube—In this type, the exhaust gas in passing through the muffler must traverse three separate tubes in which are numerous holes. This is an excellent silencer, but it is relatively higher in cost. This type is generally used for automotive engines.

Louvre—This is a type that incorporates the absorption principle. It is designed to modulate the wave front of the exhaust gas without restricting the flow of the bulk of slower-moving gases.

Every make of muffler or silencer is one of these general types or a variation or combination of two or more types.

More About the Louvre Type

In this type of silencer, the high wave fronts are split into many parts taking advantage of their tendency to follow the path of least resistance. This path is assisted by the low pressure area created in the rear or outlet chamber of the silencer.

The low pressure area extends to the space between the outer and inner shell, thus providing a path of least resistance for the expanded wave front before it reaches the central baffle. This is very important, for if the wave front is allowed to travel straight through the front chamber it will be reflected back from the baffle and will resist the next wave front as it enters the chamber. The louvres, figuratively speaking, slice the wave front into many parts while the slower-moving bulk of the gas flows through those closer to the inlet and without restriction.

Splitting up the high wave fronts before they have a chance to strike a solid obstruction, and preventing the atmosphere from re-entering the pipe as in the case of "ramming" will prevent the formation of many of the harmonic oscillations and reflections that produce the most objectionable transient, or "bang" noises, in the exhaust.

The louvre-type muffler makes use of two such splitting or treating units and has been found adequate to fulfill all but the most critical requirements. For exceptional silencing, additional splitting sections are added to gain any degree of silencing desired. This is possible because of the extremely low resistance to the gas flow in this type of treating section.

After passing through the silencer, the exhaust flow is so freed from pulsation or oscillation, that regardless of the length of pipe to the atmosphere, there is no tendency for a wave front to reform.

Muffler Cooling

Mufflers are offered in both air-cooled and water-cooled arrangements. In the air-cooled type, a jacket is placed around a combination cone and stack. Air is induced at the bottom of the jacket by a venturi action. This type affords a means of assisting to ventilate or to heat the engine room, as the case may be, by circulating the heated air or as a means to produce air circulation in a room.

The water-cooled type silencer is generally of the wet type in which water is sprayed into the exhaust gas stream and is either drained off or is discharged with the exhaust gas flow.

Materials

Most mufflers are made from ordinary mild steel because of low cost and workability. These are satisfactory for most applications. Stainless 18-8 steel is used for installations where corrosion-resistant qualities are needed and where high exhaust temperatures are encountered.

Since at present this stainless material is highly controlled and available only for government contracts, some mufflers are now being made using 430 non-nickel-bearing stainless steel. This material is not as corrosion-resistant as 18-8, but tests show that it will withstand high temperatures quite well without scaling. It is also somewhat lower in cost than the 18-8 material.

Some manufacturers are now coating mild steel with a ceramic covering to increase the corrosion and heat-resistant qualities, thus replacing 18-8. Tests to date indicate this to be quite satisfactory.

Spark Arrester-Silencers

Exhaust gases from internal combustion engines, especially under certain conditions, have a tendency to

produce considerable carbon and can be the cause of fires from sparks. A spark arrester while stopping the sparks or hot particles, must not obstruct or hinder the free passage of the gases and the design must be such as to accomplish this with as simple and as low cost construction as possible.

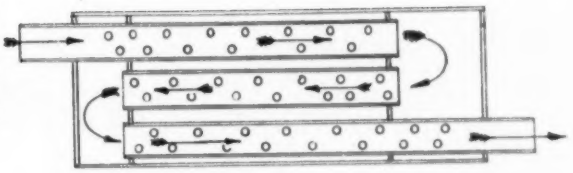
What is considered the most satisfactory design in the dry arrester is the centrifugal type. When correctly designed and installed, it will provide separation of the solids and foreign materials from the exhaust flow and at the same time, will provide free flow of the exhaust gas and allow quiet, efficient operation of the engine.

The principle of centrifugal segregation as applied to both liquids and gases is well known. The centrifugal spark arrester-silencer utilizes this principle in combination with highly efficient silencing unit, and it is successful in obtaining separation of solids regardless of density or size.

By using a stationary impeller with the louvre-type silencer or muffler, the gas is introduced at the center of the cyclone, producing maximum angular velocities and direct propulsion downward. The solids are thus concentrated in the periphery and have been accelerated downward so that when this outside gas layer is reversed in direction, the separation takes place and the solids are trapped in the dead-air space provided.

Because of the preliminary concentration of solids in the outer layer of the cyclone, the slower-moving clean bulk of gas can be allowed to travel a smooth, even curve without restriction or abrupt change in direction. The clean gas then passes through the standard modulating unit to eliminate pulsation, and enters the atmosphere as a steady flow free from all foreign material.

This type of construction eliminates the possibility of incandescent carbon particles being blown from the exhaust system, and also provides for maximum heat transfer or cooling of the gases because they must pass close to the outside shell in the annular ring surrounding the inner chambers. This greatly decreases the chance of the temperature of the gas at the discharge being high enough to ignite combustible mixtures that might be present.



Three-Pass Tube type muffler. An excellent muffler but is fairly expensive to make. Commonly used on automobiles.

Louvre type muffler. Modulates or smooths out wave fronts in engine exhaust without creating excessive back pressure.

This hazard is not restricted to the presence of petroleum products or volatile liquids, but can be present in the dust-laden air from saw mills, sawdust processing plants, flour mills, chemical plants and similar industries.

Installation Suggestions

It is generally recommended that the muffler or silencer be mounted as close to the engine as possible in order that the noise is silenced quickly. If the exhaust pipe is too long, backlash may develop. This is especially true with the large, slow-turning engine of only one or two cylinders where there may be a considerable difference between the maximum and the minimum pressures in the pipe.

If a tail pipe is to be used, it is good practice to have the average length 10 to 12 times the diameter of the pipe. It is obvious that numerous and sharp bends in the exhaust pipe or tail pipe should be avoided.

Decisions to Make

In the final selection of a muffler certain decisions must be made. The following items constitute a pretty good check list both for the correlation of your own ideas and as a minimum basis for obtaining the recommendations of the muffler builder.

1. Degree of silencing required.
   a. Moderate
   b. Commercial
   c. Extreme

2. If spark-arresting is needed, how is the arrester-silencer to be mounted.
   a. Horizontal
   b. Vertical

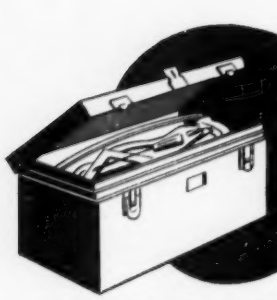
Note—In some cases where only moderate silencing is needed a simple spark arrester without further muffling may be sufficient.

3. Is cooling of the exhaust required. If so, what type?
   a. Air
   b. Water

4. Kinds of material in muffler construction.
   a. Mild steel
   b. Stainless steel
   c. Ceramic-coated

5. Size of Muffler—Selection of size should ordinarily be based on recommendation by the muffler manufacturer and will largely depend on the volume of exhaust gas to be handled. The purchaser should always give the manufacturer the engine specifications from which the exhaust gas volume can be determined. Generally, the nipple diameter of the muffler should be the same diameter as the manifold of the engine. However, in many cases this has proved faulty and too small a muffler is installed. Thus, the size of the muffler should be based on the volume of gas rather than on the outlet size of the manifold.

6. Special Sizes or Shapes of Mufflers—Where mounting space is limited or for other reasons a special muffler is required, a sketch or description of the available dimensions and nipple arrangement should be furnished the muffler supplier.



Straight from the Tool Box

This is YOUR Department. Pass along your ideas to the other fellow. Send items to the Editor, preferably with a picture or sketch. Contributors will receive $10.00 for each item upon publication.

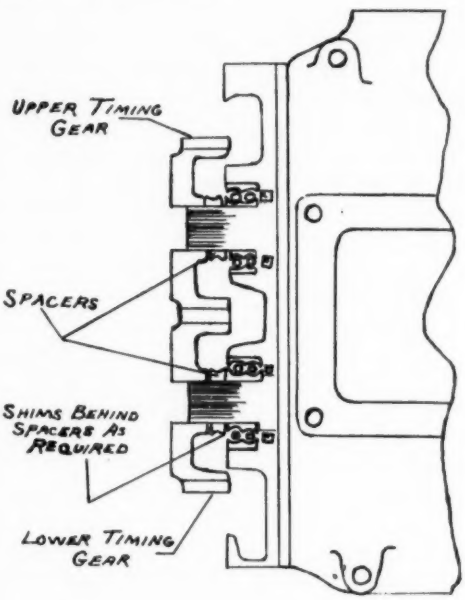
Shortcut for Settling Blower Clearances

Chet Bolay, Oakland, Cal.—Setting clearances between the rotor lobes in the blowers of GM Series 71 engines can be very time-consuming. This operation requires installation of the rotors in the blower case in the proper time and then adjusting rotors for proper running clearance by adding or removing shims behind the timing gears. The gears are helical and movement along the shaft changes the position of one rotor with reference to the other.

Each time that the shims are changed it required removal of both the timing gears which, being helical, must be pulled together. This is a slow process, as they must also be pressed into place together. To make this easier, I have a system that uses spacers.

First, you take the inner races from two discarded front ball bearings, New Departure No. 3205, that mike the same lengthwise. The blower drive shaft length from the bearing shoulder to end of the serrations is 1¾ in. With the bearing race spacer against the shoulder, the shaft extends 5/16 in. In other words, there is 5/16 in. of shaft and serrations to align and center the gears.

Using these spacers eliminates much of the work of pulling the gears all the way on the serrations and also in seating them. After proper running clearance is determined, pull gears, remove spacers, and finally press the gears home. Always be sure to give running clearance a final check before going ahead with finish assembly.



(Wish we had known about this during the war. With over a thousand of these engines to keep running, it would have saved a lot of time. It's not so bad with all the special tools but once, we recall, we had to do an emergency job tied up to some mangroves in New Guinea with one very small and one very large puller. Brother! . . . Ed.)

Stretching Bearing Life

C. G. Hilleary, Villisca, Iowa—It seems, from my experience, that the most common cause of connecting rod babbitt bearing failures result from cracking. First, a crack, probably from fatigue, starts. We think that the oil is driven by hydraulic pressure until it reaches the bearing shell. When it can go no further in this direction, it is driven between the babbitt and the shell, breaking the bond.

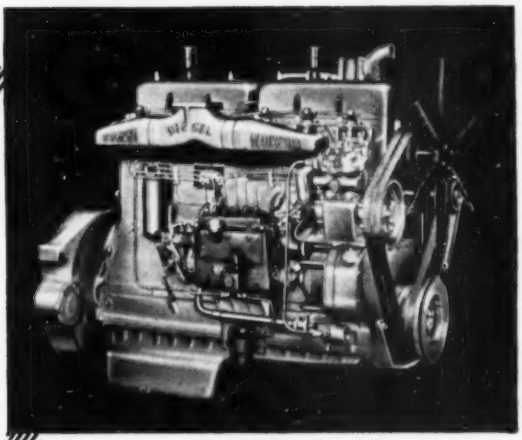
For several years we have had a schedule of pulling all connecting rod bearings every 1500 to 2000 hrs. for inspection. When we find a crack in the babbitt, we peen this crack lightly with a ball-peen hammer, then scrape the bearing until there are no high spots. This makes the crack a little lower than the rest of the bearing, closes the crack to oil and takes some of the local heat away. This procedure will not make the bearing last indefinitely, but we find that we get many more hours of operation before we have to replace the bearing.

(Many bearings run for long periods of time with fatigue cracks. There is considerable evidence, however, that the oil pressure will do just exactly what is described and eventually break away pieces of babbitt. It would be a good idea to play safe and try this procedure. It should retard final bearing failure.—Ed.)

WAUKESHA

Diesel

for heavy hauls and steep grades



148-DK High Duty DIESEL — six cylinder, 5¼-in. bore x 6-in. stroke, 779 cu. in. displacement, peak hp 200.

● No matter how heavy the hauling or how stiff or steep the grades—where the pay-off is on pulling payload—you make the miles with this Waukesha High-Duty Diesel.

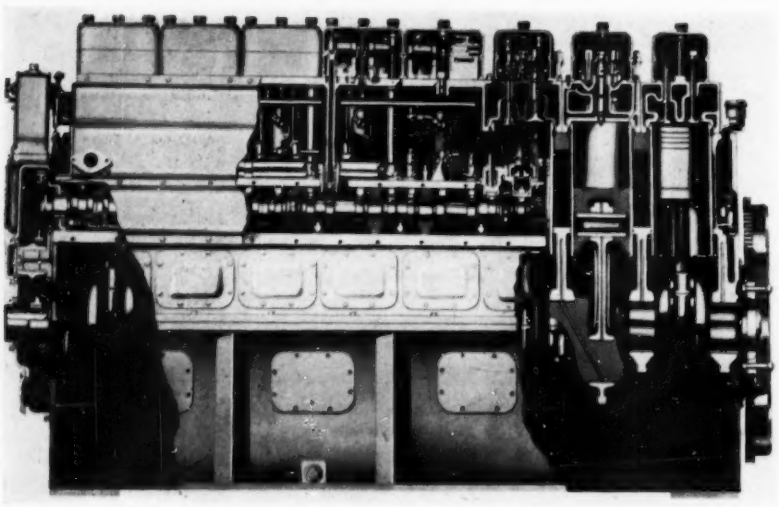
It is designed to keep on putting out the power. And, with all its exclusive Diesel design advantages, its advanced construction and material features—it can do it.

The 7-bearing hardened crankshaft is counterbalanced; has a torsional vibration dampner. There's long life in the triple element, steel-backed, copper-lead-babbitt heavy-duty, precision bearings. Wet cylinder sleeves and overhead valves are easily serviced. Heavy-duty, aluminum alloy pistons are cooled by positive oil delivery to the chamber beneath the piston crown. "Keystone" compression rings, top ring chrome plated, are non-sticking. Valves are Stellite-faced, with Stellite inserts for intake and exhaust seats. Dual valve springs. Valve guides are removable. Oil pump is outside mounted; oil cooler built-in.

Among the many outstanding Diesel design features, the patented spherical combustion chamber is most important. With its clean burning, lively acceleration, smooth shock-free operation, high fuel economy with low maintenance—it puts the pay in payload power. Send for Bulletin 1532. 171

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN • NEW YORK • TULSA • LOS ANGELES

New Products



Sterling Announces New High-Speed Diesel

A 1000-hp. diesel engine that is only a little more than half the size and weight of any other engine of its type is now in production at Sterling Engine Company, Buffalo, N. Y.

An 8-cyl. Viking model VDS-8-S (shown) has been run for intermittent service at a maximum of 1500 hp. at 1500 rpm. and weighs only 7.9 lbs. per hp. The engine has an over-all length of only 134⅝ in., a height of 64 in. and a width of 37 in.

Navy acceptance tests were conducted under military specifications for 600-kw. generator sets which requires a continuous duty of only about 900 hp. This engine has a reserve capacity far in excess of what is required for continuous duty, it was stated by Joseph W. Frazer, chairman.

The Viking has been designed for simple maintenance. Two men can remove a complete cylinder head piston and connecting rod assembly in half an hour, with only five minutes more required to remove the liner. A new liner, new piston and rod assembly and cylinder head can be installed by two men in about 45 minutes. Every bearing is readily accessible through handhole and inspection covers and can be removed and replaced in a minimum amount of time.

The Sterling Viking is made in both 6- and 8-cyl. units, both with a bore of 8 in. and a stroke of 9 in. The six has a 2714-cu. in. displacement and the eight of 3619 cu. in.

Temperature Control Catalog

The Burling Instrument Company, 5 Vose Avenue, South Orange, N. J., announces the publication of a new 12-page illustrated catalog, describing their full line of temperature controls.

Special features of this catalog are the additions of four new instruments and inclusion of tables of application and performance for all instruments. Covered also is the use of Burling Controls for temperatures from —300° to +1800° F, and in various severe applications.

Shot Peening Manual

The Society of Automotive Engineers, Inc., 29 West 39 St., New York 18, N. Y., has issued a Shot Peening Manual. Twenty-four of the country's leading authorities on shot peening, working under the SAE Iron & Steel Technical Committee, spent two years in compiling this treatise. The manual covers the entire subject on shot peening for designer, process engineer, and production man . . . from what peening is and does, to machines and materials used. It also details current practice in peening various type parts.

Copies are available from the Society at $1.50 per copy to SAE members, and $3.00 to non-members.

Arc-Welding Accessory Booklet

A new 2-color, 4-page bulletin on arc-welding accessories has been announced as available from the General Electric Company, Schenectady 5, New York.

The illustrated bulletin (GEC-864) covers more than a dozen holders, ground clamps and connectors, and describes the uses, operation and specifications of each.

Pump Reference Chart

A reference chart on small pump applications has been developed by the Tuthill Pump Company, 939 E. 95th St., Chicago 19, Illinois.

In one table this guide lists the various types of pumps, the services for which each is built, the performance characteristics, types of packing, styles of mounting, and features that distinguish each model.

Earth Movers of the Army Engineers

The Department of Defense has issued a pictorial release, describing the activities of the Army Engineers in repairing and building roads and bridges in Korea, and their training at Engineer training center at Ft. Belvoir, Va. Copies available from Technical News Letter, Magazine and Book Branch, Room 2c765, The Pentagon, Washington 25, D. C.

Twin Standard Exhaust Silencer

Kittell Muffler & Engineering Company, 195 South Santa Fe Avenue, Los Angeles, California, has available a twin standard exhaust silencer, model 1244-ECT 4.

This all-welded silencer was designed specifically for the GM 6-71 twin or quad multiple engine power plant. It consists of two 1248-EC 4 standard exhaust silencers welded together, and provided with offset intake pistons to match the twin exhaust manifolds of the GM engines.

It is mounted horizontally and directly to the exhaust ports of the twin manifold.

New Tool Holder

The Walton Company, P. O. Box 5, Elmwood Branch, Hartford 10, Conn., is offering a new tool holder.

The head of the new instrument swivels around in an entire circle, yet gives a good grip on square bits or round boring bars. Thus, it may be set for any straight, right hand, or left hand offset position. The bit is gripped top and bottom, and it is so held that no lateral motion is possible. The jaws will not break high speed tool bits or Stellite.

The holder is made in four sizes, providing a tool bit capacity ranging from 1/8 in. to 7/16 in.

"Air Cell" Signal Battery

National Carbon Company, a division of Union Carbide and Carbon Corporation 30 E. 42 St., New York 17, N. Y., announced recently their new "air cell" signal batteries. The battery, type AC-500, which uses standard glass jars, has a capacity of 500 ampere-hours and because of its higher voltage will replace copper-oxide cells in the ratio of approximately one for two, in series batteries. The permissible discharge rates being higher than those of other air-depolarized signal cells, this battery will operate efficiently in signal services usually operated by A.A.R.R. Type "A" caustic soda primary cells. Class 2 or 3, where the drain per cell does not exceed 3.5 amperes intermittent for more than 3-minute periods.

The box-type T-Series batteries have a variety of applications such as switch lamp lighting, marker lamps, bridge and pontoon lights, instruments and meters, etc., where a flat voltage curve is desirable. They are available either in single cell or two-cells-in-series units, and at rated capacities of either 300 or 600 ampere-hours, for use where the duration of the service life is up to two years.

New Industrial Hose Reel

The Zierden Company, Milwaukee, Wisconsin, have manufactured a hose reel that can be mounted out of the way any place the hose is needed.

The hose is pulled from the free rotating wheel to reach the place where needed. As it is fed out, there is no tangling, it is claimed, and it is simply pushed back on the reel where it is automatically coiled for instant re-use.

To meet the range of industrial plant needs in handling hose five different reel mountings are available. They are: through-the-wall; through-

simple as A B C

to prevent ENGINE DAMAGE

Overheated cooling water or oil pressure failure can attack any engine . . . *even your own.* And when that happens, it's liable to cause major engine damage.

But here's how such damage *can be prevented!* Simply equip your engine with the PENN Safety Control. Then, at the first hint of engine overheating or oil pressure failure, the PENN control *automatically* sounds an alarm . . . flashes a warning light . . . or stops the engine operation. Thus you can investigate and correct the minor fault before damage occurs.

Learn more about this low-cost, positive protection for new or old engines. Write **Penn Controls, Inc., Goshen, Indiana.** Export Division: 13 E. 40th Street, New York 16, N. Y., U. S. A. In Canada: Penn Controls Limited, Toronto, Ontario.

Typical Functions of PENN Safety Controls

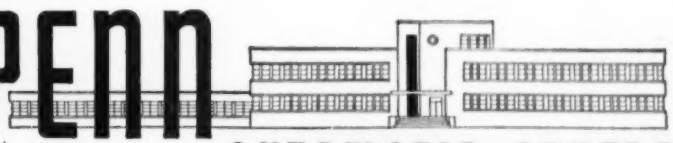
Diesel Applications. Sounds an alarm . . . closes magnetic fuel valve and sounds alarm . . . closes magnetic fuel valve only . . . closes magnetic fuel valve and opens pilot relay.

Battery Ignition Applications. Opens battery circuit and sounds an alarm . . . sounds an alarm only . . . opens battery circuit only.

Magneto Ignition Applications. Sounds an alarm only . . . grounds dual magneto . . . grounds magneto only . . . grounds magneto and sounds alarm or lights signal light.

Dual Ignition Applications. Opens battery circuit and grounds magneto.

PENN



AUTOMATIC CONTROLS

FOR HEATING, REFRIGERATION, AIR CONDITIONING, PUMPS, AIR COMPRESSORS, ENGINES, GAS RANGES

THIS QUICK-CHANGE HEAD REALLY SAVES DOWN TIME and MANPOWER

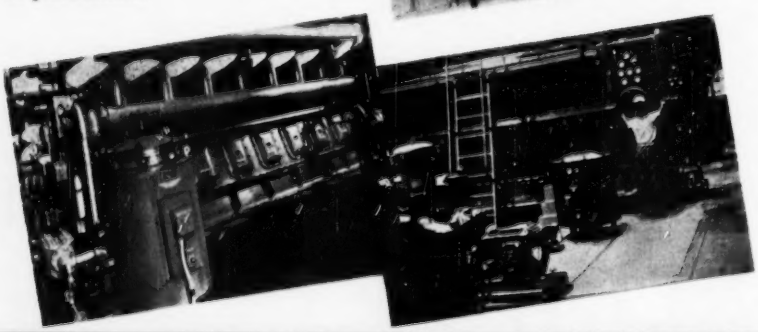
HOFFMAN FILTERS
for Diesel Fuel and Lube Oils

Simply back off the swing-bolts — turn a hand-wheel, and the cover of your Hoffman Cartridge Filter lifts and turns aside for fast, convenient cartridge changes!

Hoffman builds two series of cartridge filters. One employs Navy 7x18 throwaway units; the other uses 11x18 cartridges, either throwaway or repackable type. Both series provide efficient, dependable removal of contaminants from fuel and lubricating oils — for low cost.

WRITE FOR BULLETINS

Full descriptions and specifications are contained in Bulletins A-649 and A-703. Write for them. Illustrated here are three typical Diesel installations protected by Hoffman filters. Get the facts for your requirements.



INDUSTRIAL FILTRATION DIVISION

U.S. HOFFMAN MACHINERY CORPORATION

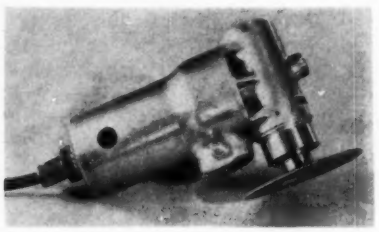
214 LAMSON STREET, SYRACUSE 6, N. Y.

CANADIAN PLANT: CANADIAN HOFFMAN MACHINERY CO., LTD., NEWMARKET, ONT.

the-floor; regular; island; and overhead.

Lightweight, High-Speed Disk Grinder

The Balmar Corporation, Woodberry, Baltimore 11, Md., has introduced a new lightweight, high-speed disk grinder, the "Diskette", for one-hand operation with a speed of approximately 8000 rpm.



Priced to sell at $69.50, it is designed to grind, sharpen and shape all metals, as well as woods, plastics and ceramics. Special attachments are available for hole burring, hole polishing, rotary filing and cutting, solder cutting, etc.

The tool weighs 4½ lbs. and is 9 in. in over-all length, with an outside diameter of 2¾ in. Its one-hand operation compares with the two-hand operation most commonly employed with other grinders.

The Diskette, with its universal motor of 110 volts, ac. or dc., housed in an aluminum alloy casting, comes furnished with three composition disks, 4 in. in diameter and 3/32-in. thick, of No. 36, 80, and 120 grit, as well as a screw driver and a 3/16-in. pin wrench. An oil-resistant, 3 wire cord, 6 ft. long, enters the tool at the back. The motor is air-cooled by a fan in the housing, thus making long run jobs possible. A dust filter protects the motor from dust and grit carried by the cooling air. All moving parts of the motor are mounted in ball bearings, and hardened spiral bevel gears provide quiet operation. A double-action pushbutton switch controls the motor.

New 3-Hp. Split-Type Crane Cab Cooler

The Dravo Corporation, Air Conditioning and Combustion Department,

Dravo Building, Pittsburgh 22, Pa., has developed a new split-type crane cab cooler of the 3-hp. size.

The new model is designed to maintain a temperature of 80° to 85°F. within a crane cab when the surrounding ambient temperatures reach 130°F. The unit, which supplies continuous ventilation, is equipped with electric strip heaters for winter heating, dust and dirt filters and activated carbon canisters for fume and odor removal.

Operation and control for summer and winter temperatures is fully automatic. The small, compact evaporator section can be installed within the cab, while the condenser section may be located in any convenient place on the crane. The two sections are connected by refrigerant piping.

New Line of AC. Welders

Metal & Thermit Corporation, 100 E. 42nd St., New York 17, N. Y., announces a complete new line of ac. welders. The new welders incorporate three special features:

First is insulation with silicone, said to provide greater overload capabilities, permit more compact, lighter weight design, and prolong life.

Second is the combination of low open circuit voltage with arc stabilization, accomplished by incorporating capacitors in the secondary circuit to

provide an extra surge of current if the arc starts to go out.

Third is an automatic hot-start which makes arc striking easy by providing just the right amount of current boost to start the arc at any current setting without manual adjustment. The hot-start device is a simple relay and resistor combination connected across the transformer secondary in series and is fully automatic in

Snap-on

SERVES INDUSTRY EVERYWHERE THROUGH THESE 42 FACTORY BRANCH WAREHOUSES

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SNAP-ON TOOLS CORPORATION, 8064-E 28th Ave., Kenosha, Wisconsin

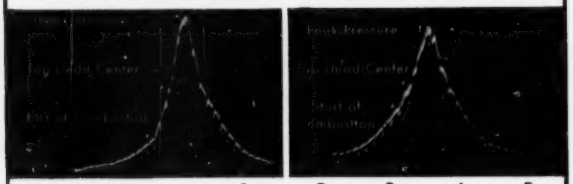
"pulse-measured" Diesels give...

MORE POWER, LESS WEAR

Results of Diesel "Full Load Test"*

Photo shows conditions at start of test (condition # 1)

Optimum injection and peak pressure timing for engine (condition # 4)



CONDITIONS	1	2	3	4	5
Start of Injection	29° BTC	26°	24°	23°	21°
Maximum H.P.	1048	1056	1073	1084	1026
Start of Combustion	12.5° BTC	7.5°	4°	3.5°	3°
Peak Pressure Location	8° ATC	10°	12°	12°	12°
Max. Firing Pressure	988PSI	923	872	860	835

NEW LINEAR

Pressuregraph

Completely re-engineered, it now offers a more accurate and detailed picture of the firing, of regular and instantaneous pressure variations . . . up to 200,000 separate pressures measurements per second.

The **Linear Pressuregraph** provides linear stabilized measurement of pressure rise with time (vacuum to over 10,000 PSI), broad frequency response (zero to over 20,000 CPS). In addition, it offers these exclusive features: Greatly simplified pickup; temperature and drift compensated; permits up to 200' of pick-up cable to be used.

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Explosion, gas or hydraulic, pressure in internal combustion or jet engines, injection pumps, pipe lines, compressors.

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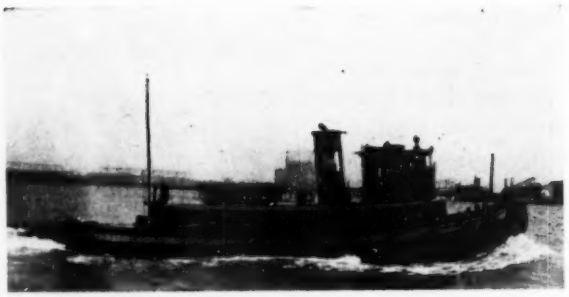


REPOWERING *CALLED FOR* BRUTE-POWER BATTERIES—*Surrettes!*

The Independent Towing Company, Philadelphia, outstanding eastern seaboard's towing firm, have recently completed a comprehensive project, modernizing and repairing several of their large tugs with diesels, installing new auxiliary systems.

What could be more natural than the installation of Surrette Batteries, built in capacities to crank even the biggest diesels? That's what Independent thinks about Surrettes. "They have been giving us the service that pleases us," says Chief Engineer Kenneth Meyle, "and we are glad to recommend them."

SURRETTE "GIANTS" HAVE WHAT IT TAKES!

EXTRA CAPACITY—far greater, in same space, than conventional batteries.

EXTRA CRANKING POWER—same batteries can be used even for cranking the largest diesels when starting equipment is of same voltage.

EXTRA HEAVY CONSTRUCTION FOR EXTRA LONG LIFE—Special design REZISTOX positive plates; Microporus Rubber plus slotted rubber envelopes completely enclose each positive plate PLUS armoured fibre glass separator mats—not single, not double but TRIPLE insulation contributes to the balanced design of this long life battery. Extra heavy fittings; genuine hard rubber containers.

Ask your dealer for Specification Sheet M-1, and the Surrette Batteries best suited to your needs. Write us if he cannot supply you.

SURRETTE STORAGE BATTERY CO., INC.
JEFFERSON AVE., SALEM, MASS.

Surrette **STORAGE BATTERIES**

operation. Controls of the mercury relay are sealed in and no maintenance is required at any time.

New Clamp-Type AC. Volt-Ammeter

Columbia Electric Manufacturing Company, 4553 Hamilton Avenue, Cleveland 14, Ohio announces their new type AC-1 volt-ammeter — a

clamp-type, hand-sized measuring instrument that does two separate jobs, measuring volts and amperes.

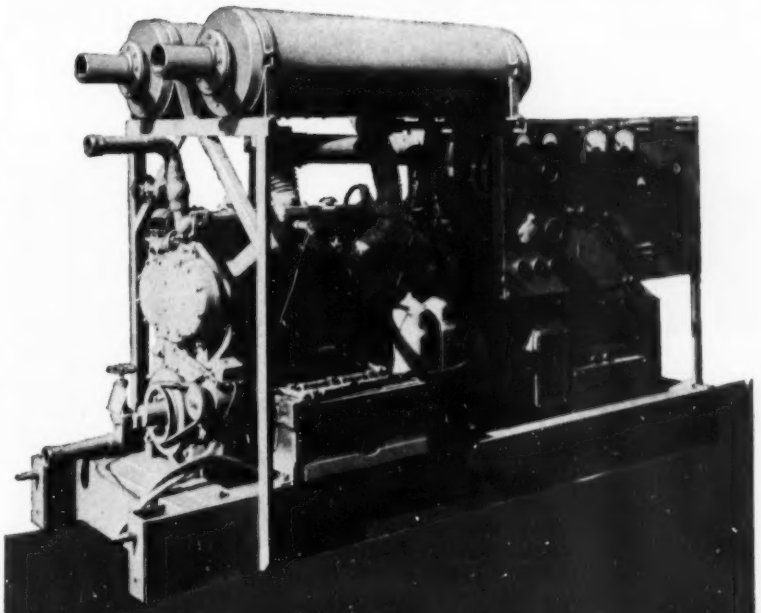
Readings are made without breaking circuit or insulation. To read amperes the trigger is pressed, opening the pair of insulated jaws so that they can be easily encircled around the power cable or bus bar. The jaws will accommodate cables up to 1½ in. in diameter and bus bars up to 2 by ½ in. Four amperage ranges are available; 0-12, 0-60, 0-120, 0-600 ac. amperes, and two voltage ranges; 0-150, and 0-600 ac. volts.

Small enough to insert in a pocket, the instrument is easily held and operated with one hand. It weighs less than two pounds. Overall dimensions are 11 by 3-1/2 by 1-7/8 in.

Control Valves Handle Extremes in Pressure & Temperature Cycles

Two new control valves, models 1570 and 1580 have been announced by the Annin Co., 3500 Union Pacific Ave., Los Angeles 23, California. They are said to be capable of handling a wide variety of materials at extremes of temperature and pressure. These include liquid nitrogen at a temperature of —32°F and a pressure up to 3000 psi., red fuming nitric acid at room temperatures and superheated steam up to 1000°F.

MAXIM SILENCERS*



GOOD PUBLIC RELATIONS FOR PORTABLE POWER ANYWHERE

* Two Maxim Exhaust Silencers shown on General Motors Diesel generator set built for portable power for "on location" movie making.

Consult MAXIM

THE MAXIM SILENCER COMPANY
93 Homestead Ave., Hartford 1, Conn. Dept. W.L.
Gentlemen:
Please send me your bulletin on Exhaust Silencer.
Name _____
Company _____
Address _____

Here's low cost *Life Insurance* for diesel engines

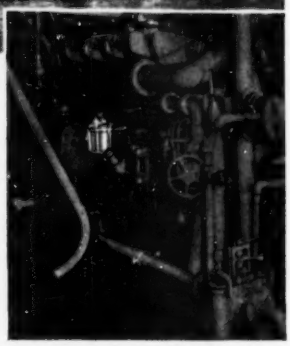
NUGENT FILTERS for fuel and lube oil

The amount of protection afforded by fuel and lube oil filters is dependent upon the effectiveness of the filters... and all filters are not equally effective. You'll see what we mean if you'll compare Nugent Filters with any others. By actual test, Nugent Absorbent Oil Filters remove 99.8% of the dirt. Dirt and carbon particles as small as a few microns are removed and prevented from getting to those areas where they can accelerate wear and shorten engine life.

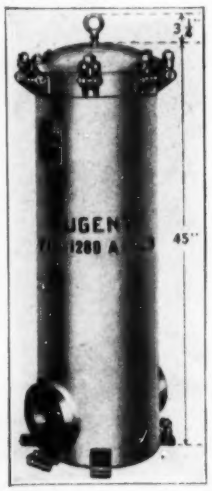
Size for size, Nugent Filters offer greater filtering area. In addition, they make possible a choice of full flow or by-pass filtering with the same unit. Recharges are inexpensive and easy to install. Simple piping makes installation no problem.

Write for descriptive literature that shows how to insure the long life of your diesel.

Three 720 H. P. Cooper—Bessemer Diesel powering the American Barge Line Company's new "Mount Vernon", illustrated above, are equipped with Nugent Filters for fuel and lube oil, helping to assure the owners that they will get all the fine service these engines are designed to give.



Above—One of the Nugent Duplex Fuel Oil Filters installed on the "Mount Vernon." Below—A Nugent Lubricating Oil Filter of the type used on the "Mount Vernon."



Wm. W. Nugent & Co., Inc.
417 N. Hermitage Ave. CHICAGO 22, ILLINOIS

OIL FILTERS, OILING AND FILTERING SYSTEMS, TELESCOPIC OILERS, OILING DEVICES, SIGHT FEED VALVES, FLOW INDICATORS

Established 1897

Unique design feature of these single seated valves is the external self-balancing arrangement which provides a balanced valve effect in operation. This feature provides ease of operation at extreme pressure differentials and still retains the positive bubble-tight shutoff essential in many applications.

Also retained in this new design is the single seat split-body construction. Teflon seat seals and radiation fins for extreme temperatures are available.

Light-Weight Electrode Holder

A new light-weight, 300-ampere electrode holder has been introduced by the Tweco Products Company, known as the Model A-732 "Twecotong"

holder. It features a light-weight, high copper alloy for maximum conductivity. Raised upper lever allows plenty of room for the operator's hand with a welding rod in the jaws. Body and tip ends of the holder are insulated with "Super-Mel" insulators. Tip end insulators are interchangeable.

The new holder will handle from 7/32 in. through 1/16 in. electrodes. The welding cable may be soldered or clamped mechanically to the body of the holder. Only 9¼ in. in length, the new holder makes it easy for the operator to weld in "hard to get at" places, it is claimed. The holder is especially designed for high-speed production, pipe welding and job shop work.

Contact Tweco Products Co., P. O. Box 666, Wichita, Kansas.

Mechanically Operated Impulse Generator

Electro Products Laboratories, Inc., 4501 North Ravenswood Ave., Chicago 40, Illinois, has available a new electro magnetic pick-up, operating without physical contact when mounted near any moving magnetic material. The pick-up is an electrical impulse

"WHY HAVEN'T I HEARD OF THIS BEFORE?"

This is what friends of DIESEL POWER readers are saying the first time they see a copy. Here is what one of our readers report.

"Have been inquiring throughout the diesel plant where I work and have found much interest in the old issues which I have circulated there. Many had no idea that such a magazine existed and are very interested in obtaining subscriptions for themselves."

New men are entering the diesel field every day—your friends and associates. You can help them in their work and help yourself at the same time . . .

you can win a **FREE** copy of one of these VALUABLE REFERENCE VOLUMES.

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For every 2 new subscriptions to DIESEL POWER, we will award a copy of the New "FUEL INJECTION SYSTEMS", which sells for $1.50.

For every 5 new subscriptions to DIESEL POWER, we will award a copy of the "DIESEL ENGINEERING HANDBOOK", Deluxe Edition. This volume covers the entire field of land and marine diesels . . . and sells for $7.50.

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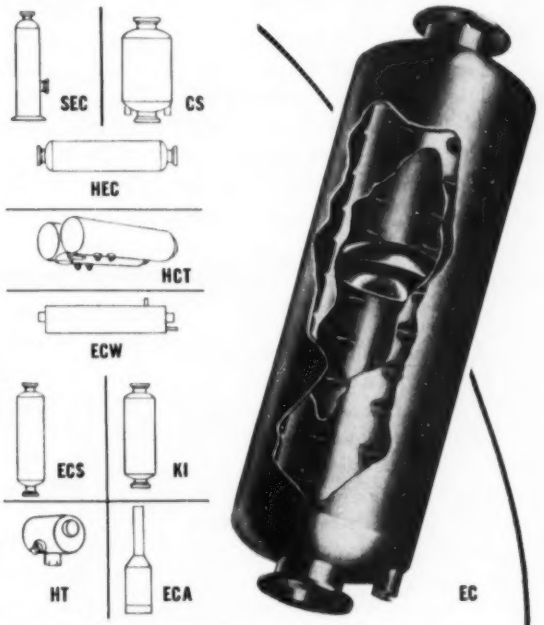
Kittell SILENCERS
stop damaging back surge... reduce engine noise to a whisper!

The Kittell method of handling a pulsating flow is unique. As the burst enters the silencer it is quickly bled off by means of a special perforated tube...completely eliminating power loss from atmospheric back surge.

The gases are then directed through louvres along the outer shell, which cools them and reduces their volume. They are then directed back through more louvres into the center of the silencer and out into the atmosphere.

This method of controlling the expansion of the hot gases, and using the kinetic energy in the moving mass of air to direct the gases through a series of louvres, smooths out the pulsations and produces a steady, whisper-quiet exhaust flow. Large free-flowing passages prevent plugging due to excessive carbon or sludge deposits.



Immediate delivery on all standard models!

All standard Kittell silencers and spark arrestors-silencers, carefully made from heavy steel and welded throughout for longer life, are immediately available for all types of engines. Special stainless steel, ceramic coated and specific purpose equipment are also available. We will be happy to quote prices and delivery dates to your specifications.

Send today for complete catalog.

Kittell Muffler & Engineering, Inc.
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12 years of silencer engineering and fabricating experience

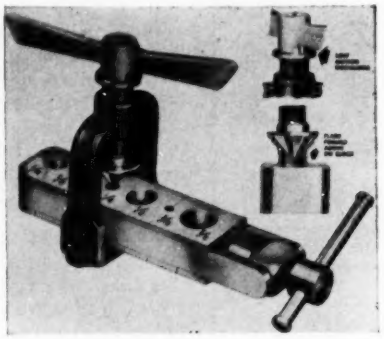
generating device that produces a voltage output proportional to the rate of motion or speed of the magnetic object. It may be actuated by the keyway in a shaft, the teeth of a gear, or any vibration or displacement of magnetic materials in the field of pick-up.

This instrument can be used for measuring acceleration and velocity, triggering or synchronizing cathode ray oscillograph sweep circuits, angular position indicator (shaft or flywheel); reference marker (degrees, position). It will indicate rpm., count operations, sequences, cycles or motion at rates in excess of 20,000 per second when used with electronic counters.

New Flaring Tool Provides Automatic Burnishing

A new tool for flaring soft copper, steel, aluminum and brass tubing, which automatically burnishes the face of the flare after it has been formed, has been announced by The Imperial Brass Manufacturing Co., 1200 W. Harrison St., Chicago 7, Illinois. The tool will make 45° flares on 3/16-, 1/4-, 5/16-, 3/8-, 1/2-, and 5/8-in. O.D. tubing for standard S.A.E. flared fitting joints.

The automatic burnishing action is provided through the use of a lost



motion mechanism in the yoke which disengages the feed during the first revolution when backing off the cone. This causes the cone to burnish the flare, giving it a highly polished finish. The cone is made of hardened steel and is of a multifaced type, with tool chrome finish.

This tool also differs from conventional flaring tools in that the flare is formed in the air above the flaring bar instead of against a bevel in the bar. This assures that the original wall thickness of the tubing is maintained at the base of the flare, and results in stronger flares which stand up better under vibration, the manufacturer reports.

The steel flaring bar is of the sliding segment type and has a single screw at the end with rod handle for leverage, which provides quick, easy tightening. Yoke is made of forged steel.

Safe Footing Speeds Assembly Inspection and Maintenance

All-steel welded tubing, expanded metal treads and platform provide safe footing and ample space for both tools and workers on portable platforms made by the Ballymore Company, Wayne, Pa., it is claimed.

These platforms can be used for assembling large machinery and ma-

---

Army Switcher

(*Concluded from page* 51)

In the process of simplifying the controls, mainline contactors have been eliminated and other electrical equipment simplified in the interest of maintenance. The electrical circuit has two motors in series, with three groups in parallel. There are no shunt steps—the operator having a choice of either full-shunt or no-shunt. Transition is made at approximately 30 mph.

The MRS-1 or "Missis" (*we are simply anticipating what the Army will do to the abbreviation*) is equipped with 6BL air brakes, with provision for vacuum brakes. They are of the single rather than the clasp type.

The 3-axle trucks are fully flexible, equalized units with special provisions for high-speed operation (up to 77 mph.). Journal boxes are friction (solid bearing) type. All conversion equipment for adapting the locomotive to various track gauges has been built into the trucks. Conversion is executed by a rearrangement of the parts, the wheels being moved on the axles by mechanical adjustment.

The locomotive uses a No. 375 rubber draft gear with provision for operation at two levels — 34½ in. and 41 in. Just about any type of coupler can be quickly fitted. Provision has also been made for application of European type buffers and vertical wheel guard to replace the pilot.

Production Features

The first of 13 of these locomotives has been delivered to the Army and the others will follow in rapid succession. They were designed, developed and will be manufactured at EMD's LaGrange, Ill., plant and the first unit is now being tested on Middle Western railroads.

In disclosing this development, Nelson C. Dezendorf, vice president of GM and general manager of EMD, paid a tribute to the foresight of the Transportation Corps. He complimented them for laying down specifications that permitted the use of a high percentage of standard domestic diesel locomotive parts.

This greatly shortened the time required for development by years and makes it possible to go into production without plant conversion in the event of a major emergency. At the end of such an emergency production of domestic types could be undertaken with small delay and no expensive reconversion.

The use of so many standard wearing parts and assemblies is also a factor that favorably affects replacement. If a lot of these units were to be shipped overseas, there would be no problem in supplying wearing replacement parts.

Significant Specifications

Overall length (between coupler pulling faces)	57 ft. 5 in.
Width (over grab irons)	9 ft. 8 in.
Maximum height above rail	13 ft. 6 in.
Distance between bolster centers	31 ft. 0 in.
Truck rigid wheel base	13 ft. 2 in.
Boiler water capacity	800 gal.
Fuel oil capacity*	800 gal.
Sand capacity	18 cu. ft.
Lubricating oil capacity	200 gal.
Engine cooling water	210 gal.
Total loaded weight on rails (with boiler)	246,000 lb.
Axle load	41,000 lb.
Maximum speed	77 mph.
Gear ratio	60/17
Wheel diameter	40 in.

*If boiler is eliminated, fuel capacity is doubled.

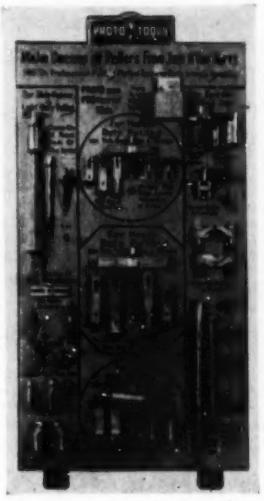
chine tools, bus and truck maintenance and other similar applications, and are built to order to meet specific requirements for length, height, width and rail construction. Eliminates unsafe horse-and-plank platforms, temporary scaffolding and heavy wooden structures.

Master Puller Has Storage Rack

Development of a "Proto" master puller set that includes a storage rack has been announced by the Plomb Tool Company, Washington & Santa Fe, Los Angeles 54, Calif. The set, called the No. SD6 "Pullermart" is suitable for garages, other repair shops and industrial plants that use all types of pullers.

In designing the storage rack, a new principle was used. Instead of mounting completely assembled sets on the rack, the individual parts of basic sets are arranged in "exploded" fashion. Parts are labeled and located in proper order for assembly, making it easy to select the parts for any desired set-up.

Wide lines divide the 3 ft. 5 in. rack into five distinct sections—enclosing parts for four basic pullers (light, medium and heavy duty and wheels),



plus a group of tools for special pulling jobs. Outlines and catalog numbers of the 59 basic parts and 22 specials facilitate proper replacement of tools after being used. The rack is made of 5/8 in. plywood and has an easel back for floor mounting.

New Literature

Pipe Tool Brochure

The 50th anniversary of Toledo Pipe Tools is commemorated by the company in a booklet entitled "Toledo Story."

The booklet gives a brief outline of the history of the company, the applications of the tools in various industries, pictures of the tools themselves, and of the various officers of the organization.

"Power Farming" Booklet

"Power Farming—A Way of Life", a 16-page booklet designed to foster understanding of the interdependence of agriculture, petroleum and other industries, has been issued by the Oil Industry Information Committee of the American Petroleum Institute, 50 W. 50th St., New York 20, N. Y.

The booklet deals with farm practices throughout the centuries and its final section presents the story of farm motorization, tracing the emergence of the commercial tractor industry.

OIL RECLAIMER

FILTER

HILCO LUBE and FUEL OIL PURIFICATION - - -

15 YEARS CONTINUOUS OPERATION WITHOUT OIL CHANGE IN DIESEL AND GAS ENGINES—NEGLIGIBLE PISTON AND CYLINDER WEAR.

THIS IS THE RESULT OF COMPLETE PURIFICATION—THE REMOVAL OF SLUDGE, CARBON, ACIDS, WATER, AND FUEL DILUTION.

HILCO UNITS IN OPERATION LONG ENOUGH TO PROVE THEIR VALUE. ONE-QUARTER CENTURY OF EXPERIENCE IS AT YOUR SERVICE.

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- FILTERS
- RECLAIMERS
- CONDITIONERS

THERE IS A **HILCO** FOR EVERY LUBRICATION AND FUEL OIL FILTERING PROBLEM - - -

YOU WANT CLEAN OIL AND CLEAN ENGINES TO SAVE EQUIPMENT—OIL AND MONEY—INVESTIGATE HILCO OIL MAINTENANCE METHODS.

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WESTON TAG Thermometers

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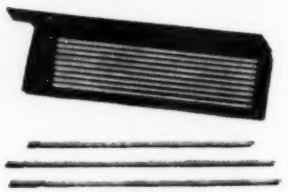
Whether your requirement calls for certified laboratory thermometers . . . or rugged all-metal industrial types . . . or thermometers for remote reading . . . you'll find *exactly* what you require in the Weston-TAG line—*the most comprehensive line of quality thermometers ever offered by ONE manufacturer.* Literature on request. WESTON Electrical Instrument Corporation, 617 Frelinghuysen Avenue, Newark 5, New Jersey.

Laboratory

ALL-METAL

—have readable, dial-type scales and corrosion-resisting stainless steel stems—stem lengths from 2" to 24"—ranges from low as −100°F. to high as 1000°F.—accuracy ½ of 1% of thermometer range.



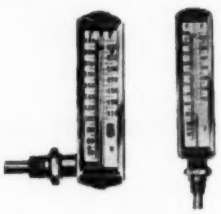
GLASS

—certified sets of ASTM Testing thermometers with overlapping ranges in protective case. Ranges from −36°F. to high as 760°F. Also precision and standard etched stem thermometers for general testing.

Industrial

ALL-METAL

—provide unmatched readability and durability—accuracy within 1% of thermometer range. Available in all types, ranges and stem lengths (2½" to 72") for all requirements.



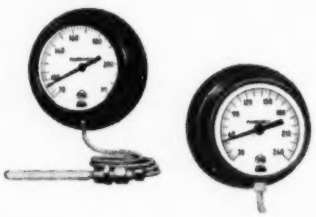
GLASS (Metal Case)

—available in all forms, all ranges, stem lengths and connections. Accuracy within one scale division. Also submarine types, metal and cupcase thermometers.

Remote Reading

ELECTRICAL

—resistor bulb sensing element permits mounting indicator any distance away from point of measurement. *Multiple* remote readings also possible by use of selector switch and several bulbs.



PRESSURE ACTUATED

—for remote reading, in 5, 6 and 8" dial sizes. Ranges from low as −325°F. to high as 1000°F. Accuracy one scale division unaffected by vibration or severe shock. Cases of iron, brass, or plastic.

WESTON Temperature Instruments

— TO INDICATE — RECORD — CONTROL

9413

ence of the commercial tractor industry.

Demineralizer Bulletin

A 4-page bulletin, which describes a system consisting of a single ion exchange unit containing a homogeneous mixture of a cation exchanger and an anion exchanger, has been prepared by The Permutit Company, 330 West 42nd Street, New York 36, N. Y.

This arrangement is said to provide a great number of individual demineralizing steps with the result that all scale-forming and other mineral impurities are reduced to the vanishing point.

New Booklet Outlines Uses For Investment Castings

The Microcast Division of Austenal Laboratories, 224 E. 39th St., New York 16, N. Y., has recently published a 16-page booklet in full color entitled "New Opportunities for The Creative Product and Design Engineer." It outlines the laboratories development of their Miscrocast process of precision investment casting from the first uses of the process in producing intricate dental appliances to the thousands of applications today in many branches of industry.

The process is explained with the use of tables, showing different alloys used in the parts together with a hardness table. Specific machine operations which may be eliminated are covered, and resultant savings in time, labor and production costs are indicated.

"Transmission Topics"

Diesel truck operators will be interested in how to utilize their power more effectively through proper transmissions.

The Fuller Manufacturing Company of Kalamazoo, Michigan, is publishing a new magazine-type house organ, "Transmission Topics", designed to cover on-and-off highway and industrial users of heavy duty transmissions.

The first issue covers a variety of Fuller users in heavy-hauling, contracting, logging, petroleum, mining and other fields.

Fuel Oil Bulletin

E. F. Drew & Co., Inc., 15 E. 26th St., New York 10, N. Y., has announced the availability of a technical folder on the problems concerned with the burning of modern fuel oils and the application of additives.

Copies are available from the Power Chemicals Division at the above mentioned address.

Packing Bulletin

A new 8-page bulletin has been issued by Greene, Tweed & Co., North Wales, Pa. Text and illustrations deal with their new Palmetto G-T Ring. Design features, operational data, installation procedures, and suggested dimensions are covered.

The ring is a packing that is being used in many commercial applications at pressures to 15,000 psi., without extrusion of the packing. It is recommended for use as seals in hydraulic and pneumatic cylinders and valves, welding machines, hydraulic steering gears, control units, testing equipment and in applications where simplification of design and weight are prime factors.

Westinghouse Maintenance Booklet

A 28-page booklet now available from the Westinghouse Electric Corporation gives a complete outline of the institution of preventive maintenance program for any industry.

The booklet discusses general preventive maintenance programs and treats in considerable detail the power equipment. A suggested schedule of work and cleaning on power equipment is presented in chart form, and the reader is referred from the chart to the general body of the booklet for more specific information.

This booklet contains all essential information on the preventive maintenance for turbines, generators, switchboards, motors, controls, etc. The frequency of inspection and care are given along with any additional precautions that may have to be taken for special parts.

For a copy of this booklet, B-5477, write the corporation, Box 2099, Pittsburgh 30, Pa.

DIESEL CRANKSHAFT REPAIRING AND REFINISHING

Picture shows a thirty-foot crankshaft with 13" diameter journals which was broken through the No. 6 web— receiving final inspection after new crank and center coupling sections were installed and machined to original tolerances.
Shafts of all sizes and types successfully repaired and refinished.
Call, wire or write for particulars on our field repairs and emergency service.

WASHINGTON IRON WORKS, INC.
Established 1876
SHERMAN, TEXAS

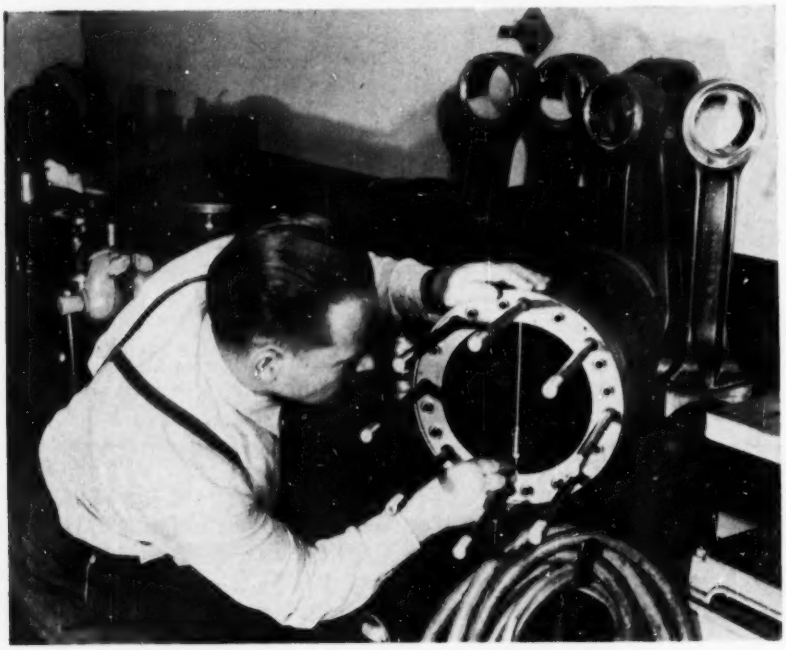
TITUSVILLE *Diesel* **CRANKSHAFTS**

A Standard Specification
. . . AMONG AMERICA'S LEADING DIESEL ENGINE BUILDERS FOR MANY YEARS

Precision Tolerances and Finishes as your Requirements demand . . . Turn to Titusville for Engineering and Research Counsel—an organization of master Craftsmen with facilities second to none in the industry.

Struthers Wells
STRUTHERS WELLS CORP. *Titusville Forge Division*
TITUSVILLE, PENNA.

Field Notes



Locomotive Engine Aids in Lubricant Development

The West Coast's only stationary test locomotive engine has now "traveled" the equivalent of 120,000 miles.

This trackless diesel engine was installed last spring at the Martinez Research Laboratory of the Shell Oil Company for testing lubricants and fuels. It dwarfs other automobile and industrial engines located in adjacent rooms and is exactly the same engine as those in standard switching locomotives seen in rail yards the country over.

Mounted on a steel-topped concrete base that is set in cork to absorb vibrations, the 6-cyl, 600-hp. diesel engine has proven to be ideal laboratory equipment. Already it has operated more than 3000 hrs.—or the equivalent of 40 trips between San Francisco and New York.

Initial tests with the stationary engine at Martinez have already contributed to the development of new lubricants that will allow locomotives to remain on the job for longer periods without a major overhaul.

According to Shell engineer, F. H. Caudel, the engine consumes a barrel of diesel fuel an hour, but uses up only about one quart of lubricating oil in the same time. Power generated is transformed into electricity by a standard railroad dynamo which is attached as a unit to the engine. Output of this generator is measured accurately and becomes the basis upon which the efficiency of the engine is computed.

25,500 Starts Without a Miss

Recently a new series of extensive efficiency tests were given Vapor-Clarkson steam generators which are used to heat diesel powered trains and in industry for processing steam.

On test, the OK 4625 Vapor-Clarkson steam generator, sold to produce 2700 lbs. of steam per hour—actually produced, from cold feed water 3150 lbs. of steam per hour at 285 lbs. steam pressure, 83.34 per cent efficient, for a sustained test period and the steam was 99.77 per cent dry. The unit automatically modulated down to produce 1008 lbs. of steam per hour at similar pressures and efficiency. On additional tests the unit automatically turned on and off 25,500 times, never failing to light up properly.

On test, the OK 4740 Vapor-Clarkson steam generator sold to produce 4500 lbs. of steam per hour—actually produced from cold feed water 4984 lbs. of steam per hour at 285 lbs. steam pressure, 82.58 per cent efficient, for sustained periods and the steam was 99.50 per cent dry. The unit automatically modulated down to produce 1821 lbs. of steam per hour, at similar pressures and efficiency.

A-C Expands Springfield Works

General approval to a project costing approximately $15,000,000 for increased facilities of the Springfield, Ill., Works, Tractor Division, was given by the board of directors of the Allis-Chalmers Manufacturing Company recently.

More than 300,000 square feet of manufacturing floor space, and the necessary machine tools for increased production of crawler tractors, motor graders, and repair parts will be included in the program.

This will be the third expansion of the Springfield Works since 1944 when a $10,000,000 program was put under way and completed after World War II. Another modernization and remodeling project costing $3,500,000 was completed in 1951.

Preliminary plans are being drawn and it is expected construction will get under way before the middle of the summer.

Trucking Operations Forum

American Trucking Associations, Inc., held a Trucking Operations Forum, starting May 12, at the Deshler-Wallick Hotel, Columbus, Ohio. This Forum was sponsored by the ATA Equipment and Maintenance Council, the ATA Terminal Council and the ATA Council of Safety Supervisors. The general theme was better supervision and utilization of trucking facilities.

Of special interest were sessions held by the Equipment and Maintenance Council, with such discussions as "What are the Most Essential Items in Preventive Maintenance Inspections?", "Why do Valves Fail?", "The Effect of Additive on the Performance of Motor Oils", "Maintenance Cost Control—How It Is Used", etc.

Oil and Gas Power Division, ASME, Conference

The Oil and Gas Power Division of The American Society of Mechanical Engineers will hold its 24th Annual Conference and Exhibit, June 23 through 27, at the Hotel Statler, Buffalo, N. Y. General theme will be "design."

The first day of the Conference, Monday, the 23rd, will start with a Technical Session on "Crankshafts and Related Subjects." There will be a Welcome Luncheon, and the OGP is particularly honored by the appearance of R. J. S. Pigott, president, ASME, as speaker.

The afternoon will bring the second Technical Session, dealing with "Engine Lubrication", and in the evening there will be a General Technical Committee Meeting, featuring panel discussions. The audience at last year's GTC Meeting was asked what topics it would like discussed this year, and the following topics were selected: Engines, piston rings, bearings, oils, oil filters and air filters. Panel members are leading men in these fields.

Tuesday, June 24th will include the OGP Special Lecture, "Heat Transmission in Internal-Combustion Engines", by C. F. Taylor, of the Massachusetts Institute of Technology. In the afternoon there will be an inspection trip of Schoellkopf hydro-electric plant, followed by dinner at the General Brock, overlooking the falls.

The third Technical Session, to be held Wednesday morning, will deal with "Spark Ignition for High Compression Gas Engines." In the afternoon there will be a Panel Discussion on "Engines of High Specific Output", and the evening will bring the Annual Banquet. Mr. Rob Roy Macleod of Niagara Mohawk Power Corporation, Buffalo, will speak on the current situation in a talk entitled, "The American Package."

Thursday morning there will be the fifth Technical Session on "Diesel Engine Power Plants", and in the afternoon there will be a tour of the Worthington Corporation plant in Buffalo.

An all-day inspection trip will be the feature of Friday, June 27th, the last day of the Conference. A bus will drive to Olean, N. Y., where we will see the Clark Brothers Company and Van der Horst Corporation.

Throughout the Conference and Exhibit there will be exhibitors booths set up, social hours and cocktail parties, and a complete Ladies Program.

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Low Cost Temperature Control

for Jacket Water and Lube Oil

POWERS

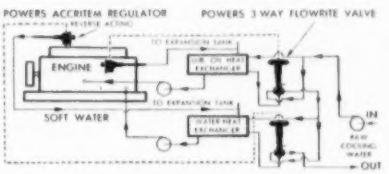
Compressed Air or Water Operated

ACCRITEM REGULATOR

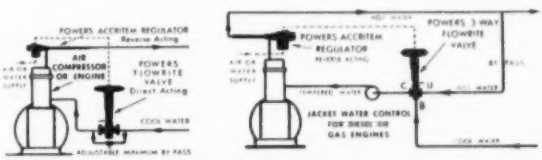
Unsurpassed for reliability and power to operate large or small size 3-way or 2-way diaphragm valves for accurate control of jacket water and lube oil cooling temperatures.

IMPORTANT ADVANTAGES

- ***Adjustable Sensitivity*** and over-heat protection.
- ***Calibrated Dial*** temperature adjustment.
- ***Simple, Rugged Construction*** withstands vibration and insures many years of reliable service.
- ***Temperature Ranges*** 50 to 250° F. and 150 to 350° F.
- ***Easy to Install.*** Requires 15 lb. supply of compressed air or water for its operation.
- ***Small Size*** — regulator head is only 2⅞" x 3⅝", sensitive bulb is 12" long with ½" I.P.S. connection.

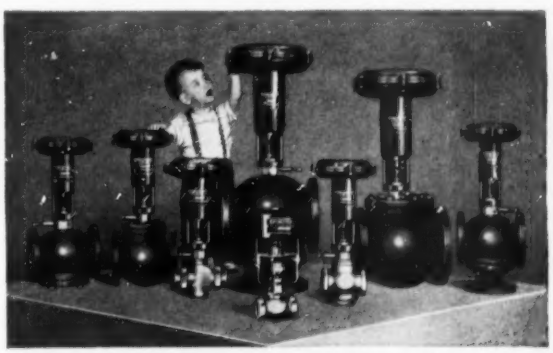


Only a few of many possible applications



POWERS FLOWRITE DIAPHRAGM VALVES controlled by Powers ACCRITEM Regulators provide an unbeatable combination for better control and lower maintenance.

Write for Bulletin 316 (a62)



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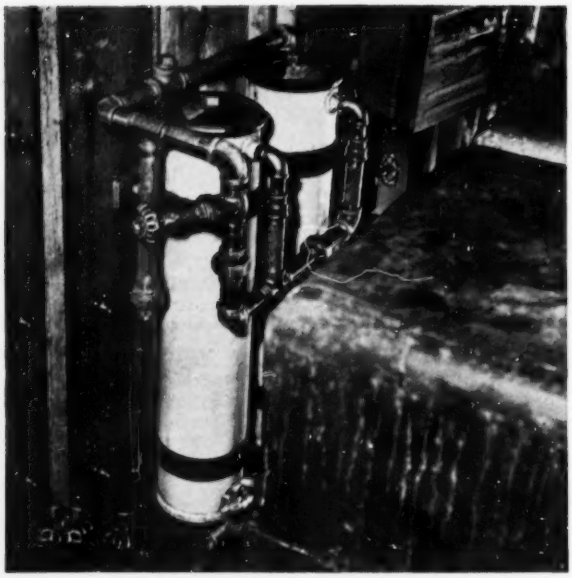
60 YEARS OF WATER TEMPERATURE CONTROL



These Fram Filcron Filters clean about 100 gallons of oil an hour at temperatures of 150-160 degrees for INVADER'S 180 hp Superior Diesel Engine.

"I rate FRAM 100% for any diesel owner!"

says fishing boat engineer

Fram Filcron Filter installation guards diesel engine of fisherman *Invader* of New Bedford, Mass., from costly and dangerous power stoppage due to oil contaminants . . . wins praise of boat's engineer, Arnold W. Bower. Without dependable diesel operation, fishing trips are unprofitable . . . and in bad weather uninterrupted power is vital to boat's safety.

Fram Filters contribute to *Invader's* profits by reducing down-time . . . keeping the *Invader* at sea for maximum lengths of time under all conditions. And the cost of Fram protection is small. Mr. Bower states, "replacing one essential bearing would be more than a year's filtering cost. I rate Fram 100% for ANY diesel owner."

Solve Your Filtering Problems with FRAM!

Whatever your filtering problem—lube or fuel—Fram Filters are the solution. Let Fram's Engineering Department PROVE that Fram Filters remove ALL engine-killing contaminants one micron (.000039") and larger . . . resulting in less down-time, lower operating costs for you. Make your diesels produce at lowest possible cost . . . write TODAY to the Fram Corporation, Providence 16, R. I. *In Canada:* J. C. Adams Co., Ltd., Toronto, Ontario.

FRAM *Filcron*

THE MODERN OIL FILTER

Waukesha Laboratory Ready in 1953

Ground has been broken for the new experimental and research laboratory of the Waukesha Motor Company, and preliminary construction is under way.

This new building, estimated to cost about $175,000 will be one story in height, rectaugular in shape, and measure 90 by 201 ft. The 18,000 square feet covered by this addition brings the total plant area under roof to over 18 acres. Special interior construction and installation of facilities for modern experimental and research techniques for the further development of internal combustion engines and in related fields will be included.

Present plans call for completion in January, 1953, when much of the research equipment now used will be transferred to the new laboratory.

Cummins Diesel Race Car Ready for Testing

The 1952 Cummins Indianapolis 500-mile entry, Cummins Diesel Special No. 28, built for experimental testing purposes, is now ready for preliminary testing. These first trials will take place as soon as the track, Indianapolis Speedway, a 2½-mile brick and asphalt oval, is open for practice.

An important feature of the car's highspeed, lightweight, horizontal, 6-cyl. diesel, is the turbocharger. It is a supercharger driven by the waste exhaust gases of the engine. Speed of the 401-cu. in. diesel will be over 4000 rpm., and while the exact horsepower has not been released, it is expected to be in excess of 350.

Cummins engineers have shifted the entire drive line weight off-center to the left side of the car, and they believe this allows for a much lower center of gravity. This design will help curb excessive tire wear on the right front wheel, and permit greater driver comfort by climating straddling of the transmission.

The cylinder block and the heads of the diesel have been cast from aluminum. All the rest of the castings have been made from magnesium. The use of these materials have lowered the weight of the engine considerably. Dry weight of the car will be approximately 2100 lb., while the weight with fuel and drive will be near 2800 lb.

The engineers are hoping to get at least 8 mpg. from the commercial diesel fuel used, but do not intend to try to go the entire 500 miles without refueling.

Wind tunnel tests at the University of Wichita, Wichita, Kansas, assisted in determining the final shape of the car. Most of the equipment ordinarily mounted on the side of other race cars has been covered up, and the wind shield has been so designed that the driver, Fred Agabashian, is entirely out of the wind stream.

There is a possibility that the wheels may be made of magnesium; however, preliminary runs will be made on standard wire wheels. Rear tire sizes are 7.50 by 18's and front tire sizes are 6.50 by 18's.

The chassis of this new car was built by Kurtis-Kraft in Los Angeles, and flown to Columbus, Indiana, in late January, where the engine and other mechanical parts were installed by Cummins.

Diesel Power Plant Conference At Iowa State

The Engineering Extension Service, Iowa State College, Ames, Iowa, announces its Third Diesel Power Plant Conference to be held July 21-23.

In planning this Conference they built the program around the suggestions made by operators who have attended previous conferences. The following subjects are on the tentative program:

Improving fuel efficiency, problems of dual fuel engines, piston ring problems, crank case explosions — cause and prevention; demonstration on combustion analysis and indicator cards, cooling equipment and problems; water treatment—cause and prevention of scale and corrosion in the cooling system, control methods; air filters; lubrication, filters and bearings—one half day panel; plant records; plant noise control; discussion of DEMA Standard Practices; and a working session on fuel injection.

M.I.T. Offers Special Course

Special courses in internal combustion engines and in lubrication engineering will be offered by the Massachusetts Institute of Technology this coming summer session.

The program in internal combustion engines from June 9 to June 20 will emphasize the analytical approach to performance and design problems and to the planning and control of experimental and development programs. It is planned primarily for the engineer responsible for the design and development of improved models of diesel or Otto cycle engines, and for the teacher of these related subjects. The course will be under the direction of C. Fayette Taylor, professor of automotive engineering and director of the Sloan Laboratories for automotive and aircraft engines.

Lectures in the course will be followed by discussion periods and in many cases by laboratory demonstrations as well as by conducted visits to related laboratories, including those for experimental stress analysis, dynamic strength of materials and gas turbines.

A specialized program in lubrication engineering will be offered from June 23 to July 3 to provide an opportunity for engineers in industry to study the application of new techniques and methods in this field. This program has the sponsorship of the American Society of Lubrication Engineers and other technical groups. It will be under the direction of Brandon G. Rightmire, professor of mechanical engineering and in charge of the M.I.T. lubrication laboratory. He will be assisted by other engineers on the faculty and by representatives from industry.

Other courses deal with metal cutting (May 26-June 6); vibration (August 4-15); photoelastic method of stress analysis (August 18-30).

Tuition is $125. Write to Prof. E. H. Huntress, Rm. 3-107, giving experience and background.

Brazil to Expand Bahia Refinery

Construction has started on the ex-

PRECISION FINISHING
interchangeable parts—
lower maintenance costs
Even the heaviest parts of every FULTON DIESEL are craftsman-machined to such close tolerances that they are completely interchangeable. Result:
• Smoother running — higher operating efficiency
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WHERE DEPENDABILITY COUNTS, YOU CAN COUNT ON FULTON
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pansion of Brazil's first modern refinery—completed in 1950 at Mataripe in the State of Bahia—it was announced recently by the M. W. Kellogg Company, refinery and chemical plant engineer-contractors of New York City, who designed both the new and original facilities. Kellogg Pan American Corporation is supervising construction.

The expansion will double the capacity of the present 2500-bbl.-per-day combination thermal refinery. It will also include catalytic polymerization which will raise the overall octane rating of the finished gasoline, as well as facilities for production of LPG (liquified petroleum gas).

Modification in the original plant, built for Conselho Nacional do Petroleo, are being made to process the lighter crudes which are now available from local fields in the area. Flexibility has been stressed in both the new design and the revamp, so that the integrated plant will be able to run any of the local crudes.

ASTM 50th Anniversary Meeting

The American Society of Testing Materials will celebrate the 50th anniversary of its existence at its meeting in the Hotel Statler, New York City, June 23-27. Many new and interesting pieces of scientific and testing equipment will feature the Exhibit of Testing Apparatus and Laboratory Supplies to be held at the meeting. Leading manufacturers and distributors of instruments and laboratory supplies will emphasize the continued progress being made in providing research and testing engineers with suitable facilities for evaluating the properties of all kinds of materials. There will be new and improved types of equipment covering the determination of the mechanical, physical, electrical, optical and chemical properties of materials of all kinds. Various types of non-destructive testing will be featured.

This exhibit affords all those concerned with research and testing work, whether of a production, control, or research nature, to see concentrated in one place many of the newer developments in the apparatus field.

Adjoining the apparatus exhibit will be the 8th Photographic Exhibit in which members of ASTM and member companies will display photographs related to the theme: Materials, Testing and Research. A large number of extremely interesting prints and photomicrographs will be shown.

Any one interested is cordially invited to attend both apparatus and photographic exhibits.

The ASTM, since its incorporation in 1902 has concentrated its work on the promotion of knowledge of engineering materials, the standardization of specifications and the methods of testing. In this effort it has cut across and earned the gratitude of every field of engineering. DIESEL POWER AND DIESEL TRANSPORTATION takes this opportunity to congratulate the society on its birthday and wish it the best of luck for the future.

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Transport operators all over the world have learnt to trust this sign.

In any language the letters on the C.A.V. sign stand for first-rate service facilities, maintained by highly-trained craftsmen, using special precision equipment.

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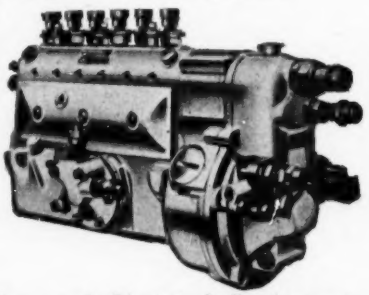

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Cummins-Peerless Pump Combination Gets Lab Approval

Three models of Cummins diesels coupled to Peerless fire pumps have been approved for fire protection service by Factory Mutual Laboratories of Boston, Mass. This is the testing organization for Associated Factory Mutual Fire Insurance Companies, of which there are nine.

This testing group now lists the 150-hp. model HI-600-F, the 200-hp. model NHI-600-F, and the 275-hp. model NHIS-600-F, manufactured by Cummins Engine Company, Inc. at Columbus, Indiana, together with the models of Peerless pumps they power, in the manual "Approved Equipment for Industrial Fire Protection." All Cummins diesels listed by Factory Mutual were previously approved by Underwriters' Laboratories, Inc., another nationally known insurance testing agency.

According to the Laboratories' report, the three units tested were given an endurance test of eight hours, during which numerous readings were frequently taken. The units were run continuously at rated capacity for two hours and at 150 per cent capacity for two hours. Dynamometer tests were also run on all three pumps.

New Data on Ductile Cast Iron

Recent studies at the National Bureau of Standards substantially increases available information on the effects of different additives on the formation of nodular graphite. Because of its ductility and superior strength, nodular cast iron (having nodular graphite structure) has excited considerable interest since its production was first described in 1948. Both cerium and magnesium, added in small amounts to the molten iron, have been used successfully to produce ductile cast iron.

Additives investigated at NBS were magnesium, magnesite, iron sulphide, calcium, nickel-chromium-molybdenum and boron. Cerium was not included, because published information on its application as a nodulizing agent was relatively complete when the study was begun. Besides the different additives, the investigation included such variables as composition, melting and pouring temperatures, and cooling rate.

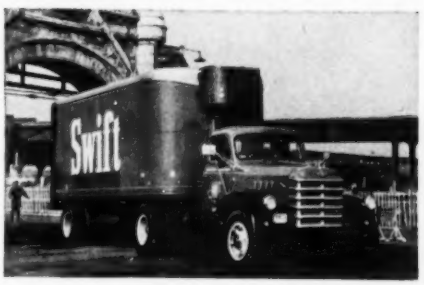
Japanese Research on Bearing Oil Flow

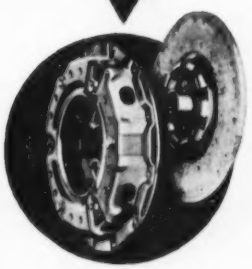
A recent release from the Faculty of Science and Engineering, Waseda University, Tokyo contained results of experiments that have been conducted there on effects of oil hole position and pumping action in plain cylindrical bearings of the long and short type.

The tests indicated the following results:

1. An oil hole located 180-270 deg. in advance of the loaded point permits maximum oil flow, lowest coefficient of friction, minimum amount of heat generation, and is the best position.
2. The quantity of oil flow is approximately inversely proportional to the

This Truck of Today Will





Last Years of Tomorrows

Today's Diamond-T diesel truck tractor is designed to keep going years longer than usually is expected of a heavy-duty truck. So, the ROCKFORD CLUTCHES that are original equipment in it are built for long, trouble-free service. Let ROCKFORD clutch engineers work with your development department to design successful power transmission controls for *your* heavy-duty units.

ROCKFORD CLUTCH DIVISION
1301 Eighteenth Avenue, Rockford, Illinois, U.S.A.

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B-W ENGINEERING MAKES IT WORK -
B-W PRODUCTION MAKES IT AVAILABLE

ENGINEERING BULLETIN SENT ON REQUEST

ROCKFORD CLUTCHES

coefficient of friction and heat generated.

3. When the oil hole is located in the ±45 deg. field of the loaded point, oil does not flow into the bearing. When the oil hole coincides on the loaded point, the bearing seizes rapidly.

4. The above results hold for the short bearing also.

5. The short bearing has a higher coefficient of friction than the long bearing, but its heat generation is somewhat less, because the oil flows in larger quantity by side leakage than in the longer one.

It will be noted that the results of this work in Japan coincides with work that has been done in this country.

Boeing Building Gas Turbines for Navy

The Boeing lightweight gas turbine engine is now being manufactured on a production basis for the U. S. Navy, Boeing Airplane Company announced recently.

A new division of the company has been set up in Seattle to handle design, production and marketing of the compact 200-lb., 175-hp. engine.

While tests continue on further refinements and many new applications, production gas turbines now are being delivered for wholly military uses, Boeing stated.

Already undergoing tests in a Navy personnel boat, a Kaman helicopter and a Kenworth heavy duty truck, further installations are planned for a light aircraft, a military vehicle, a generator and a ground power unit for aircraft. Details of these and other experimental uses have not been released.

Current production engines are being built for the Navy Bureau of Ships and will be used to generate electrical power for minesweepers.

Boeing production facilities now include machinery for building the entire engine with exception of acces-

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How to do this? Just circulate recommended solution of powerful Oakite scale-dissolving compound throughout entire water-circulating system—jacket water coolers, intercoolers, aftercoolers, etc. Oakite Compound No. 32 quickly, thoroughly removes scale and rust . . . leaves base metal undamaged . . . steps up heat exchange efficiency, cuts equipment downtime.

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Model L Pumps
Here is the pump that's known throughout the diesel industry for its dependable performance in fuel transfer and hydraulic governor service. Tuthill Model L is a positive displacement, internal gear rotary pump, mechanically sealed for quiet, leak-free operation and low power consumption. Capacities from .33 to 3 g.p.m. in wide pressure ranges. Available as either single or double-pump units. Write for Tuthill Model L Bulletin.
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PREMAX
PRESSURE INDICATOR
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of COMPRESSION and
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OF EVERY TYPE OF DIESEL ENGINE
ONE OF THE FEATURES
Responsible for Its Overwhelming
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Maintenance requirements reduced to minimum. Needs no field adjustments, no lubrication. Calibrating means built-in—making possible quick check of calibration.
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ACCURATE PRESSURE READINGS
as high as 1700 P.S.I.
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7000 BENNETT STREET • PITTSBURGH 6, PA.

sories, standard parts such as bolts and nuts, accessory gear drives and reduction gearing.

Tubing Production Speeded by Rotary Straightener

About a year ago a problem in straightening steel tubing faced the Summerill Tubing Co., division of Columbia Steel & Shafting Co., Carnegie, Pa.

Despite having a variety of machines to straighten carbon and alloy steel bars, and steel tube from 0.015 to 0.125 in. wall thickness and tensile strengths from 55,000 to 120,000 psi., production difficulties were constant in straightening certain small sizes of tube such as alloy steel tubing with 0.250 in. O. D.

A new rotary straightener was installed early in 1951 for the specific task of handling steel tube ranging in O. D. from 0.156 to 0.437 in., at a production speed of 120 ft. per minute.

This machine made by Mackintosh-Hemphill Co., Pittsburgh, is now credited with eliminating former production problems. One man, instead of two, now works on 10 to 25 ft. lengths of this tube and with the full roll contact secures straightness and finish end to end, better than required by commercial tolerances.

The Summerill cold finishing mill provides tubing for fabrication into many products, such as mechanical tubing for machine and aircraft components and high pressure diesel injector tubing.

Tocco Appoints Far East Representative

Due to rapidly expanding demand and sales for its products in the Orient, the Tocco Division of Ohio Crankshaft Company announced recently the appointment of the Cosa Corporation as Sales Representative in the Far East.

Frank Nobu, Cosa's Japanese Representative, was formerly General Manager of the machine tool division of Mitsui Bussan Kaisha, Ltd., largest importers of machine tools to Japan in prewar days. He is now president of Kaigai Tsusho K. L., (a Cosa affiliate) in Tokyo, Japan, and has a staff of seven Japanese sales engineers, most of whom have been trained in this country.

Kaigai Tsusho K. L. is sending an electrical engineer to the States who will spend six months with Tocco in order to acquire a thorough training in equipment and applications.

Montreal Loco. Works Has Good Outlook

Annual report of Montreal Locomotive Works, Ltd., for 1951 reflects the first full year of operations devoted exclusively to the production of diesel-electric locomotives.

The report points out that shortages of material hampered production in the first six months, but that output increased 60 per cent during the final half. The year's profits were earned entirely in the last half, re-

flecting anticipated economies from the changeover to diesel production as well as the increase in output. Company's backlog of unfilled orders now amounts to $18,500,000, a 39 per cent increase over last year.

The company is further adopting a policy of more diversified manufacture to achieve a greater stability of earnings. To this end orders from the petroleum and chemical industries for heat exchangers and pressure vessels were three times the 1950 figure.

In regards to the company's reentry into the world locomotive market, an order was completed for the New South Wales railway in Australia, and a contract was received for 48 diesels for the Central Railway of Brazil.

DPA Approves 564 Certificates of Necessity

Certificates of necessity for accelerated tax amortization of 564 new or expanded defense facilities, involving the proposed investment of $792,758,000 were approved by the Defense Production Administration from March 7 to March 20, DPA announced recently.

DPA reported that of the 564 certificates approved, 186 are for facilities involving proposed expenditures of $100,000 or less to which projects DPA gives special consideration to encourage small defense plant expansion. Special consideration also is given to all applications designated by NPA's Office of Small Business as meriting attention under the same criteria.

Of the certificates approved, 8 of the 10 largest were to pipe lines. They are: Trunkline Gas Co., Houston, Tex., pipe line for natural gasoline; Plantation Pipe Line Co., Atlanta, Ga., for pipe line transportation; West Texas Gulf Pipe Line Co., Pittsburgh, Pa., for oil pipe line transportation; Shell Pipe Line Corp., Houston, Tex., for pipe line; Panhandle Eastern Pipe Line Co., Kansas City, Mo., for transmission of natural gas pipe line; Southern Natural Gas Co., Birmingham, Ala., for gas pipe line; Texas Pipe Line Co., Terrebonne Parish, La., for pipe line transportation; Phillips Pipe Line Co., Bartlesville, Okla., for pipe line.

NYC President Reports to Stockholders

Acquisition of new diesel-electric locomotive units by the New York Central Railroad and its subsidiaries reached a new high in 1951, the road's president, Gustav Metzman, disclosed in the company's annual report to stockholders.

The Central System added 420 units to its diesel-electric fleet last year, more than in any previous years. Units presently on order and scheduled for delivery this year and next will bring the System's total to 1939 or about 54 per cent of requirements for full dieselization.

Mr. Metzman cited acquisition of the diesel-electric units and of new freight cars and passenger cars in 1951 as part of "further substantial improvement of our physical plant, contributing both to efficiency and to the quality of our service." He point-

Burlington
CONTROL PACKAGE
TYPE GM { FOR ENGINE GENERATOR SETS

- Automatic and manual voltage regulation.
- Dual voltage potential transformers
- Dual ratio metering transformers.
- Operating controls conveniently grouped on front of cabinet.

The Burlington Control Package, Type GM, housed in a rugged 14 gauge steel cabinet. Contains essential metering and voltage control for portable or stationary engine generator sets. Fills the need for many applications where a separate switchboard is not desired.

Write for Bulletin GM-100.

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Star Performers For High Pressure

500 Series
Rotary Geared Pumps
with Herringbone Gears

These quality-built Brown & Sharpe pumps are particularly suited for diesel pressure lubricating systems up to 500 p.s.i. Needle bearing construction, combined with balanced herringbone gear design, assures smooth, dependable operation at high speeds. Leakage problems eliminated by use of double self-balancing mechanical seal . . . no glands to adjust. Six sizes available with capacities from 5.1 to 37.6 g.p.m. at 0 lbs pressure. Operating characteristics fully described in Pump Catalog. Write for copy. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

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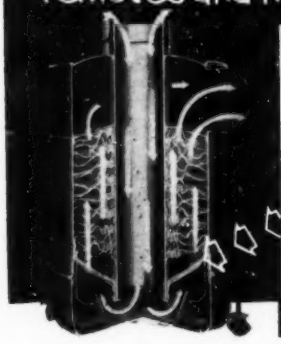
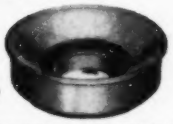
New Tray-Type AIR CLEANER
removes and holds more dirt!



RECOMMENDED FOR HIGH-CAPACITY ENGINES on large tractors, rock crushers, power shovels, etc. Large dirt-holding capacity allows longer interval between servicing.



REMOVABLE TRAY SIMPLIFIES SERVICING. Entire tray is quickly removed for cleaning. Multiple screens prevent clogging of condensing element.

IN THIS NEW Donaldson heavy-duty cleaner, the removable multi-screen "tray" and revised oil cup design feeds more of the condensed oil back into the air stream adjacent to the center tube.

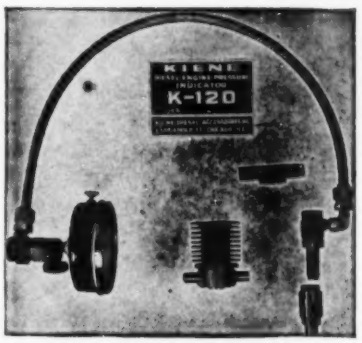
A balanced distribution of oil across the entire lower element has been achieved, eliminating both overloaded and "thin" areas.

Extensive tests in the field over a period of five years prove conclusively that the new cleaner has a higher efficiency and a greater dirt-holding capacity. We invite manufacturers to write or call for design data and test reports.

DONALDSON CO., INC. 666 Pelham Blvd., St. Paul 4, Minnesota
Donaldson Co. Ltd. (Can.), Chatham, Ont.

Donaldson AIR CLEANERS

KIENE MODEL K-120 UNIVERSAL PEAK PRESSURE INDICATOR



Model K-120 with cooler body and nozzle dummy.

For Testing Firing and Compression Pressures on all Models of Diesel and Gas Engines.

Dependable — Easy to Use — Rugged. May be Used With or Without Flexible Tube.

MODEL K-120 Indicator has but one moving-part—nothing to wear or get out of adjustment.

VALVE—Gas trap type with diaphragm type check valve having adjustable lift. Stainless steel valve and seat.

No springs—No pistons—no complicated adjustments — No temperature corrections — no pressure loss in check valve.

GAGE READS TRUE PRESSURE—MAY BE RECALIBRATED ON ANY GAGE TESTER

Check readings can be made over and over again by releasing indicated pressures with bleeder valve.

GAGE—Hydraulic 3½ inch dead weight tested in suitable range to specification requirements.

ADAPTORS available for most models of engines manufactured in U.S.A. Other models made to order at reasonable prices.

DESCRIPTIVE BULLETINS AND PRICES FURNISHED ON REQUEST

Manufactured under patents No. 2280411, No. 2328328, others pending

KIENE DIESEL ACCESSORIES, INC.
10352 PACIFIC AVE. FRANKLIN PARK, ILLINOIS

ed out, however, that "chiefly because of two major adverse factors, the year's financial outcome did not fully reflect the benefit of these advances."

The two factors mentioned were the "sick" strike at key switching centers early in 1951 and "the fact that freight rate increases authorized by the Interstate Commerce Commission were inadequate to meet greatly increased costs of operation."

The Central's president said, however, that "long-term implications" were "more encouraging than the results as seen at short range."

New EMD Research Group

Electro Motive Division of General Motors Corporation is looking ahead to the day of full railroad dieselization, when the demand will be chiefly for parts and maintenance. They are trying to discover other channels for the tremendous skills and facilities that have been built up.

They have established a specialized group of its most experienced personnel to study ways in which engineering and manufacturing techniques and facilities accumulated in the development of the diesel locomotive may be applied in the development and manufacture of other products to American railroads.

Nelson C. Dezendorf *R. M. Dilworth*

Nelson C. Dezendorf, general manager of the Division and vice president of General Motors, announced the initial assignment of two of Electro-Motive's pioneers to the new group. They are: O. F. Brookmeyer, former general sales manager and R. M. Dilworth, former chief engineer, who for the past few years has headed the advanced engineering activity of EMD. Mr. Dilworth will explore the engineering aspects and Mr. Brookmeyer the commercial availability aspect of post-diesel application of Electro-Motive's skills and facilities. Others will be added to the group as its work grows.

Mr. Dezendorf made it clear that these future developments would not be put in operation until railroad dieselization demand will permit a reduction in current high locomotive manufacture.

Mr. Brookmeyer joined the original Electro-Motive Company in Cleveland as sales manager. He directed the sales aspects of the introduction of diesel motive power through its infancy into the stage of generally accepted equipment. His experience gained through this period of development will be applied in the exploratory character of his new assignment.

Mr. Dilworth has been with the Division since 1926, when he joined as chief engineer. Ability to unite all of the many phases of electric-driven, internal combustion engine powered

locomotives — from the early gas-electric rail cars through the most modern diesel locomotive — has been one of his outstanding contributions. In 1948 he became engineering assistant vice president and in that capacity has been in charge of important advanced engineering projects, falling outside the usual scope of the normal engineering activities.

Large Tanks are Safer

Thinking of installing tanks? Here are some points to consider from the Tax Economics Bulletin published by the American Petroleum Institute.

First, the larger the tank, the sturdier its construction and the greater its thickness. This gives it a stronger resistance to corrosive action by various types of soils, even stronger than might be supposed, because a metal's resistance to corrosion increases geometrically as its thickness is increased.

Second, larger tanks minimize the frequency of filling operations. This is most significant, as safety statistics show that human failings cause most accidents, it is only logical that the fewer times fuel is handled the less chance there is of an accident.

Third, a larger tank makes the handling itself a safer operation in that it cuts down the possibility of overflow. When the capacity of the tank to be filled is less than that of the delivering tank truck, the danger of overflow is greater than when the storage tank can take more fuel than a truck's full capacity.

Finally, this greater safety of larger storage tanks is translated into greater safety on the highways. It means fewer deliveries have to be made—thus relieving traffic congestion in many urban areas.

Organizational News

Alcoa Vice Presidents

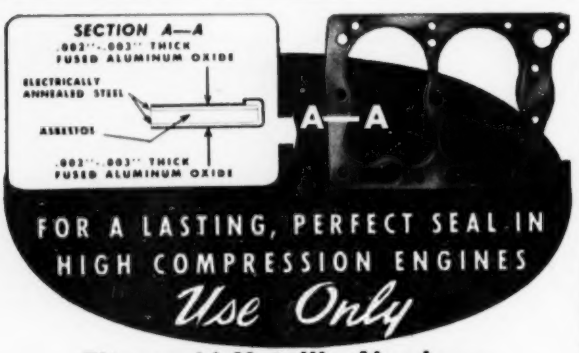
Three executives of Aluminum Company of America have been elected to newly created vice presidencies, it was announced recently.

Gordon W. Cameron, treasurer since 1943, became vice president and treasurer, Arthur P. Hall, director of public relations and advertising, becomes vice president in charge of those fields; and C. F. Nagel, Jr. chief metallurgist, assumes the third new vice presidential post.

New Nordberg Distributor

Appointments of Overvold Distributing, Inc., 13 Fourth St., Moorhead, Minnesota as distributor for Nordberg 4FS diesel engines is announced by Nordberg Manufacturing Co. In this position the firm will cover North and South Dakota, northwestern Minnesota, northern Nebraska and the eastern counties of Montana and Wyoming for Nordberg.

Overvold Distributing, Inc., was founded in Watertown, S. D., in 1928 and was moved to its present location in 1934 because of the proximity of markets for electrical generating equipment for farm service. In 1939 the firm expanded its coverage to include ranches, hatcheries, hospitals,



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Use Only

Fitzgerald Metallic Aluminum-Fused-Oxide Steel Asbestos Gaskets

Grease Retainers — Cork Gaskets

FITZ-Rite Treated Fiber Gaskets for oil, gasoline and water connections. Complete Sets For Motor Rebuilders.

FITZGERALD *Gaskets*

SINCE 1906

The Fitzgerald Manufacturing Company

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There's a Fitzgerald Gasket for every Engine

For Less Cost than Replacement!

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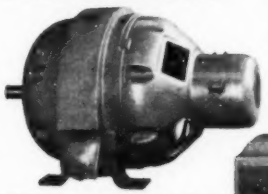
U. S. PATENTS 2,048,578, 2,314,604 AND 2,412,698

PORUS - KROME VAN DER HORST

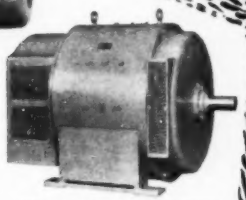
Good for the Life of your Engines

CHAMPION PERFORMERS



93.8 KVA, 900 RPM, A.C. Generator with Direct Connected Exciter.

COLUMBIA



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A.C. AND D.C. GENERATORS

For the greatest exhibition of quality and service use performance proved Columbia A.C. and D.C. Generators. Available for coupled service, belt drive, single or two bearing.

A.C. Generators: 6¼ to 1000 KVA
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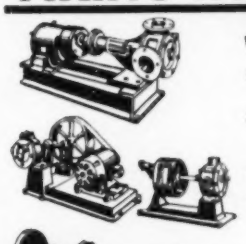
VIKING ROTARY PUMPS



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2. Positive suction and discharge. Self priming. No pulsation. Integral relief valve on pump head if desired.
3. Sizes ranging from ½ to 1050 gpm.
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5. Complete line of metals and their combinations to fit your needs.
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Cedar Falls, Iowa

See Our Catalog in SWEETS

resorts, etc., with the result that its personnel has extensive experience in the application of diesel light and power plants for continuous or emergency service.

Marion Elects

Marion Power Shovel Company elected three new officers at a recent annual meeting.

John P. Courtright

John P. Courtright was elected president and general manager. He has been with the company since 1927, has been executive vice president and formerly was sales manager. He succeeds Harvey T. Gracely, forced by illness to assume an inactive status except for possible special assignments.

J. Malcolmn Strelitz was elected chairman of the board.

Other new officers are Adrien F. Busick, Jr., vice president in charge of engineering, and Maurice V. Cornell, vice president in charge of sales. David E. Rizor was named assistant to the president in matters pertaining to sales and service.

Officers reelected are Alex Gibson, vice president and treasurer, Merle Virden, secretary and assistant treasurer, Walter C. Kraft, assistant secretary, and Newton B. Schott, assistant secretary.

New directors on the 15-man board are Jay H. Maish of Marion; James D. Mooney, New York industrialist, and Martin M. Issler, an investment adviser of New York.

Twin Disc Appoints

The Twin Disc Clutch Company announced recently the appointment of Donald E. Beaton as assistant general manager, Hydraulic Division, Rockford, Illinois. This is a new position, created as part of the over-all expansion program.

Donald E. Beaton

Beaton is under the division manager, and will help integrate and coordinate all phases of manufacturing operations at the Rockford plant. Associated since 1936 with Thompson Products, Inc., Cleveland, he has been factory manager of Thompson's Accessories Division for the past six years.

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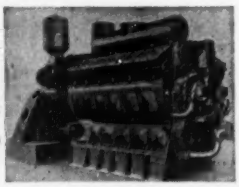
for IMMEDIATE SHIPMENT
Unit Capacities
100 to 1875 Kva A.C.
50-60 Cycles
Various Voltages



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ALL AROUND DIESEL MAN

"Eleven years experience in operation, maintenance, repair and supervision of a wide variety of Diesel Engines, both marine and industrial. Also compressor pump and machine shop experience. Also installation experience. Worked foreign construction as chief mechanic and foreman. Practical speaking knowledge of Spanish. Married, 35, excellent health. Desire position that offers security. At present employed. Available about September. Would like to correspond with employers who can use the above experience, preferably in the foreign field but would consider a satisfactory position in the U. S. All correspondence will be considered confidential. Write to Box 500, Diesel Publications Inc., 192 Lexington Avenue, New York, New York."

Buyers' Guide Number

Coming in June

Cummins Executives

Three additional members were elected to the Board of Directors of Cummins Engine Company, Inc., at a recent annual meeting of shareholders.

L. W. Beck *D. J. Cummins*

L. W. Beck, vice president, sales, was named to the board. He joined the company in 1939 as manager of Cummins Diesel Sales Corp. of Illinois, the Chicago dealership. In 1940, he was named regional manager of the Cummins Central Region. He became general sales manager in 1946 and in 1948 was named vice president, sales.

D. J. Cummins, vice president, engineering was also named. He has been with the company since its formation in 1919, serving in various capacities until 1943, when he was made manager of the research laboratory. In 1946, he became manager of quality control and in 1947 he held the position of manager of engineering and quality control. In April, 1948, he was promoted to vice president, engineering.

Mr. Harrison, vice president and treasurer, the third member named joined the company in 1944, serving as materials manager, assistant controller, controller, and in 1948 was named vice president and treasurer.

New ASTM Treasurer

The American Society for Testing Materials has announced the appointment of Robert J. Painter as new treasurer of the society. He succeeds John K. Rittenhouse, who has retired after 43 years of service with this national technical group. It was also announced that Dorothy P. Douty would be assistant treasurer.

Following graduation from Rensselaer Polytechnic Institute with a degree of Civil Engineer, Mr. Painter was on the Rensselaer faculty for a time, later with the Bethlehem Steel Company, and has been on the ASTM Staff since 1931. He will continue as assistant secretary, to which office he was appointed in 1946. He will also continue as associate editor of the ASTM Bulletin and handle various technical contacts as in the past.

Miss Douty, as assistant treasurer, will be directly in charge of accounting and many financial records, and will also assist in connection with budgets and ASTM investments.

Mr. Rittenhouse, retired treasurer, was the first full-time employee of the Society, beginning 1909. He was closely associated with the society's first secretary, Dr. Edgar Marburg, and after many years as assistant treasurer he was appointed treasurer in 1946.

Minneapolis-Honeywell Promotes

William H. Steinkamp has been named sales manager of the industrial division of Minneapolis-Honeywell Regulator Company, it was announced recently.

Mr. Steinkamp has been industrial field sales manager since 1943. He succeeds L. Morton Morley, who continues as vice president of the Brown Instruments division and who will assume greater responsibilities concerning division policies.

A graduate of New York University in 1928, Steinkamp joined the Brown division in 1930 as field sales engineer, and has represented the Brown division in New York, Buffalo, Cleveland and Pittsburgh, where he served as branch manager.

Gould Battery Sales Reorganization

The Industrial Division of Gould-National Batteries, Inc., recently announced a widespread revision of its sales forces in eastern, midwestern and Pacific territories.

F. A. Miller, former New York regional sales manager, was elevated to coordinator of sales at Trenton headquarters, and Frank Keenan of the headquarters sales staff was promoted to its managership.

Pittsburgh and Detroit territories, hitherto administered by the Cleveland regional office, have become bases for regional sales offices. O. W. Rider, former Cleveland district manager, will become regional manager at Pittsburgh and John P. Kelly, formerly the Philadelphia representative, will manage the Detroit regional office.

New appointee as regional manager in the New York office is Malcolm Janis. Stanley J. Mahurin, Denver area representative, has been promoted to San Francisco district manager.

Nordberg Sales Engineer

Appointment of Wayne G. Slife as sales engineer in the Dallas, Texas

Wayne G. Slife

office of the Heavy Machinery Division has been announced by the Nordberg Manufacturing Company.

Mr. Slife, a graduate of the University of Illinois and a veteran of the U. S. Army Air Corps, joined the company in 1952. Before that time, he was with the Elliott Company and before that with an electrical and industrial equipment distribution company as general manager.

Detroit Diesel Distributor Appoints

Stephens-Jones, Inc., construction equipment distributors of Des Moines, Iowa have announced the appointment of R. D. Redner as diesel engine sales manager. Mr. Redner was formerly sales representative of the Detroit Diesel Engine Division of General Motors Corporation in Iowa and surrounding states.

As Stephens-Jones, Inc. represent Detroit Diesel in Iowa and several counties in Nebraska, Redner will continue his association with the GM Diesel engine in his new capacity.

"AMOT" THERMOSTAT

Complete line available from ½" pipe size to 6" pipe size

Automatic temperature control for jacket water or lube oil for engines and compressors from 3 hp to 5000 hp.

"Amot" thermostats will give your engines many years of dependable operation without any servicing or adjusting. Very reliable under conditions of extreme vibration.

Used for automatic temperature control on pipe line engines, electric power plants, marine engines, drag lines, and on all other engine applications.

Compare features and prices. Write for catalog on "Amot" thermostats.

AMERICAN MOTORS CO.

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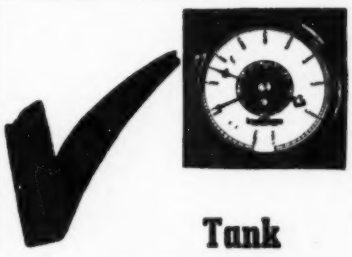

Tank Contents At A Glance

With Liquidometer remote reading fuel storage tank gauges you can check quickly and accurately oil deliveries, consumption and amount on hand. No Diesel plant is complete without one. Liquidometer or Levelometer models are available for tanks of any capacity.

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36-24 Skillman Ave., Long Island City, N. Y.

D.P.S. THERMOMETERS

These instruments are a series of marine type thermometers designed for all diesels and all plant uses — water-oil-exhaust.

FEATURES All brass construction, nickel finish, cork insulation.

(Repair service available)

No. 416H $3.00 Ea. Price No. 426D $4.00 Ea.

33 years continuously in the diesel engine game.

DIESEL PLANT SPECIALTIES CO.

Stevens Point, Wisconsin

WANTED G. M. "71"

Discarded injector parts & assemblies. 10 to 1000

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Diesel Part for T1020 Radial Guiberson Engines Injector Pumps, Valves, Pistons, Rings, Etc.

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DIESEL ENGINE DESIGNER, M. S. in M. E., thoroughly experienced in all phases of design, development, manufacture and maintenance of high speed Diesel engines, seeks responsible position with established manufacturer or consulting firm. Eastern location preferred. Please write Box 501, Diesel Publications, Inc., 192 Lexington Avenue, New York 16, New York.

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Air Maze Corp. ***
Aljon Electric Diesel Co. ***
American Air Filter Co., Inc. ***
American Bosch Corp. 13
American Brass Co. ***
American Locomotive Co. ***
American Motors Co. 89
Ashland Oil & Refining Co. ***
Atlantic Metal Hose Co. ***
Automotive Products Inc. ***

Bacharach Industrial Instrument Co., Inc. 83
Baldwin-Lima-Hamilton Corp. ***
Bendix Aviation Corp. Scintilla Magneto Div. ***
Binks Mfg. Co. ***
Borg-Warner Corp., Rockford Clutch Div. 81
Briggs Filtration Co., The ***
Brodie System ***
Brown & Sharpe Mfg. Co. 84
Burgess-Manning Co. ***
Burlington Instrument Co. 84

C. A. V., Ltd. 80
Chicago Pneumatic Tool Co. ***
Cities Service Oil Co. 17
Cleveland Graphite Bronze Co. ***
Columbia Electric Mfg. Co. 87
Commercial Trades Institute ***
Cook Mfg. Co., Inc., C. Lee 24
Cooper-Bessemer Corp., The ***
Cummings Engine Co. ***
Cuno Engineering Crop. 9

De Laval Separator Co. ***
Delco Products Div., General Motors Corp. ***
Delco-Remy Div., Gen. Motors Corp. 21
Detroit Diesel Engine Division, Gen. Motors ***
Diesel Injection—Sales & Service 89
Diesel Plant Specialties Co. 89
Donaldson Co., Inc. 85

Eaton Manufacturing Co. ***
Electric Auto-Lite Co., The ***
Electric Storage Battery Co., The 10
Electro-Motive Div., Gen. Motors Corp. ***
Electro Products Laboratories 68
Elliott Co. Third Cover
Ellwood City Forge Co. 82
Enterprise Engine & Machinery Co. ***
Erie Bolt & Nut Co. ***
Erie Forge Co. ***

Fairbanks-Morse & Co. 11
Federal-Mogul Corp. 18
Fitzgerald Mfg. Co. 86
Flori Pipe Co., The ***
Fram Corp. 78
Fulton Iron Works 79
Fulton Sylphon Div., Robertshaw-Fulton Controls Co. 4

General Electric Co. ***
General Motors Corp., A C Spark Plug Div. ***
General Motors Corp., Delco Products Div. ***
General Motors Corp., Delco-Remy Div. 21
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Golten Machine Corp., Sigurd ***
Gulf Refining Co. ***

Harrison Radiator Div., Gen. Motors Corp. ***
Hercules Electric Machinery & Equip. Co. ***
Hercules Motors Corp. ***
Hill Diesel Engine Co. ***
Hilliard Corporation, The 73
Honan-Crane Corp. ***
Hunt-Spiller Corp. 6

Ideal Electric & Manufacturing Co., Inc. ***
Illinois Testing Laboratories, Inc. ***
Ingersoll-Rand Co. ***
Interstate Diesel Service, Inc. 89

Johnson Bronze Co. ***

Kent-Moore Organization, Inc. ***
Kiene Diesel Accessories, Inc. 85
Kittell Muffler & Engineering, Inc. 71
Koppers Co., Inc., American Hammered Piston Rings Dept. ***

Lanova Corporation ***
Leece-Neville Co. ***
Link-Belt Co. 26
Liquidometer Corp., The 89
Lubal, Inc. ***
Luria Engineering Corp. 12

Madison-Kipp Corporation ***
Manzel ***
Maxim Silencer Co., The 69
Mid-Continent Petroleum Corp. ***
Mutual Chemical Co. of America ***

National Carbon Co. ***
National Metal & Steel Corp. ***
National Welding & Grinding Co. ***
Nife, Inc. ***
Nordberg Mfg. Co. 19
Nugent & Co., Wm. W. 70

Oakite Products, Inc. 82
Ohio Crankshaft Co., The ***

Penn Controls, Inc. 65
Penn Flexible Metallic Tubing Co. 22
Powers Regulator Co. 77
Pritchard & Co., J. F. ***
The Pure Oil Co. 8
Purolator Products, Inc. 5

Quincy Compressor Co. ***

Read Standard Corp. ***
Reiner & Co., John ***
Rochester Mfg. Co. ***
Rockford Clutch Div., Borg-Warner Corp. 81
Roper Corp., George D. ***

Schoonmaker, A. G., Inc. 88
Scintilla Magneto Div., Bendix Aviation Corp. ***
Sealed Power Corp. 28
Sharples Corp., The ***
Sinclair Refining Co. ***
Snap-On Tools Corp. 67
Snow-Nabstedt Gear Corp. ***
Southern Jobbing Co. 89
Standard Oil Co., Inc. (California) 14
Standard Oil Co., Inc. (Indiana) Fourth Cover
Sterling Engine Co. ***
Struthers Wells Corp. 75
Surrette Storage Battery Co., Inc. 68
Synchro-Start Products 7

Texas Company, The 2nd Cover & 3
Thomas Flexible Coupling Co. ***
Tide Water Associated Oil Co. 23
Trane Co., The ***
Tuthill Pump Co. 83

U. S. Hoffman Machinery Corp. 66
Utilities Engineering Institute ***

Van Der Horst Corp. 86
Van Norman Co. ***
Viking Pump Co. 87
Vogt Machine Co., Henry ***

Washington Iron Works, Inc. 75
Waukesha Motor Co. 63
Weston Electrical Instrument Corp. 74
Wildermuth, Inc., E. A. ***
Winslow Engineering Co. 20
Worthington Corporation 15

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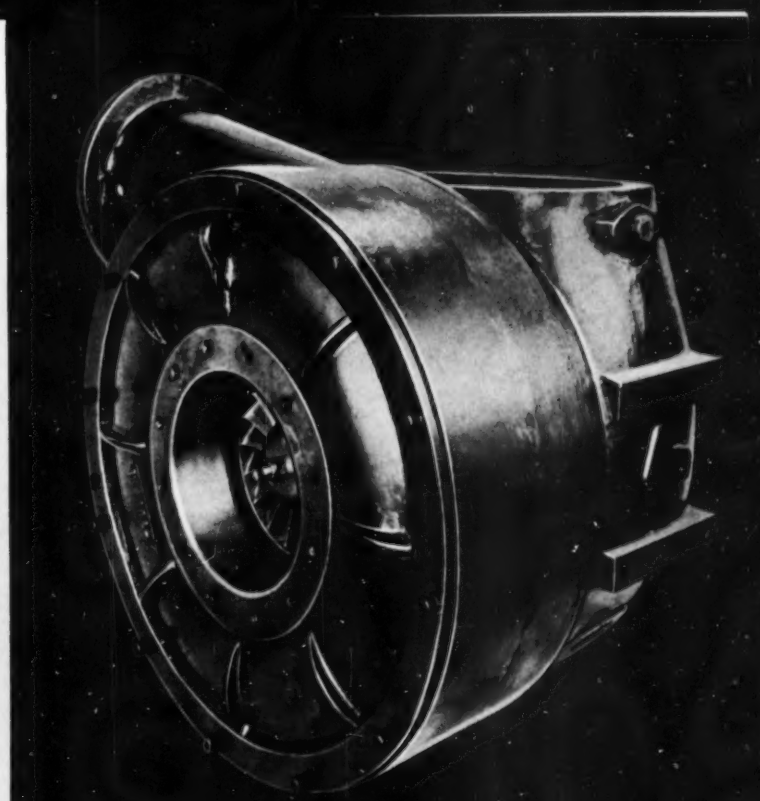
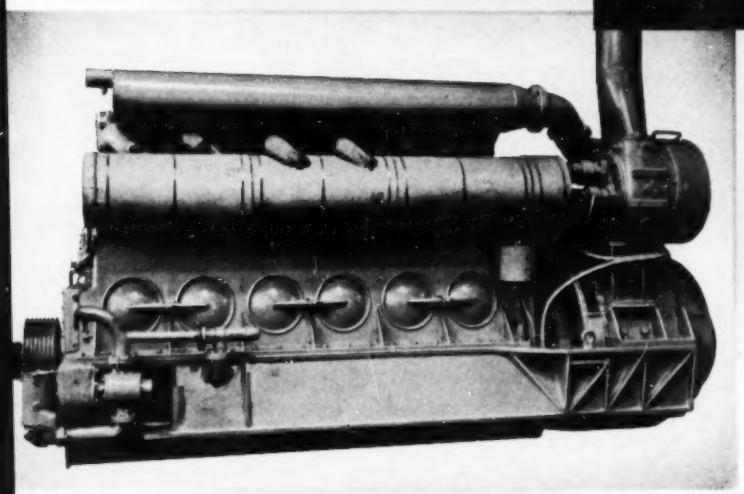
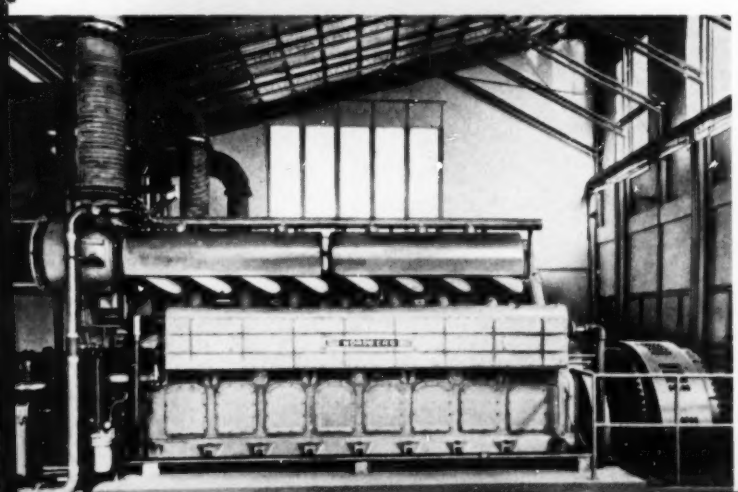




Above, Elliott turbocharger on a 1200-hp Baldwin engine for locomotive service. Below, the turbocharger is seen at the left on an installation of a 2100-hp, 8 cylinder Nordberg engine.



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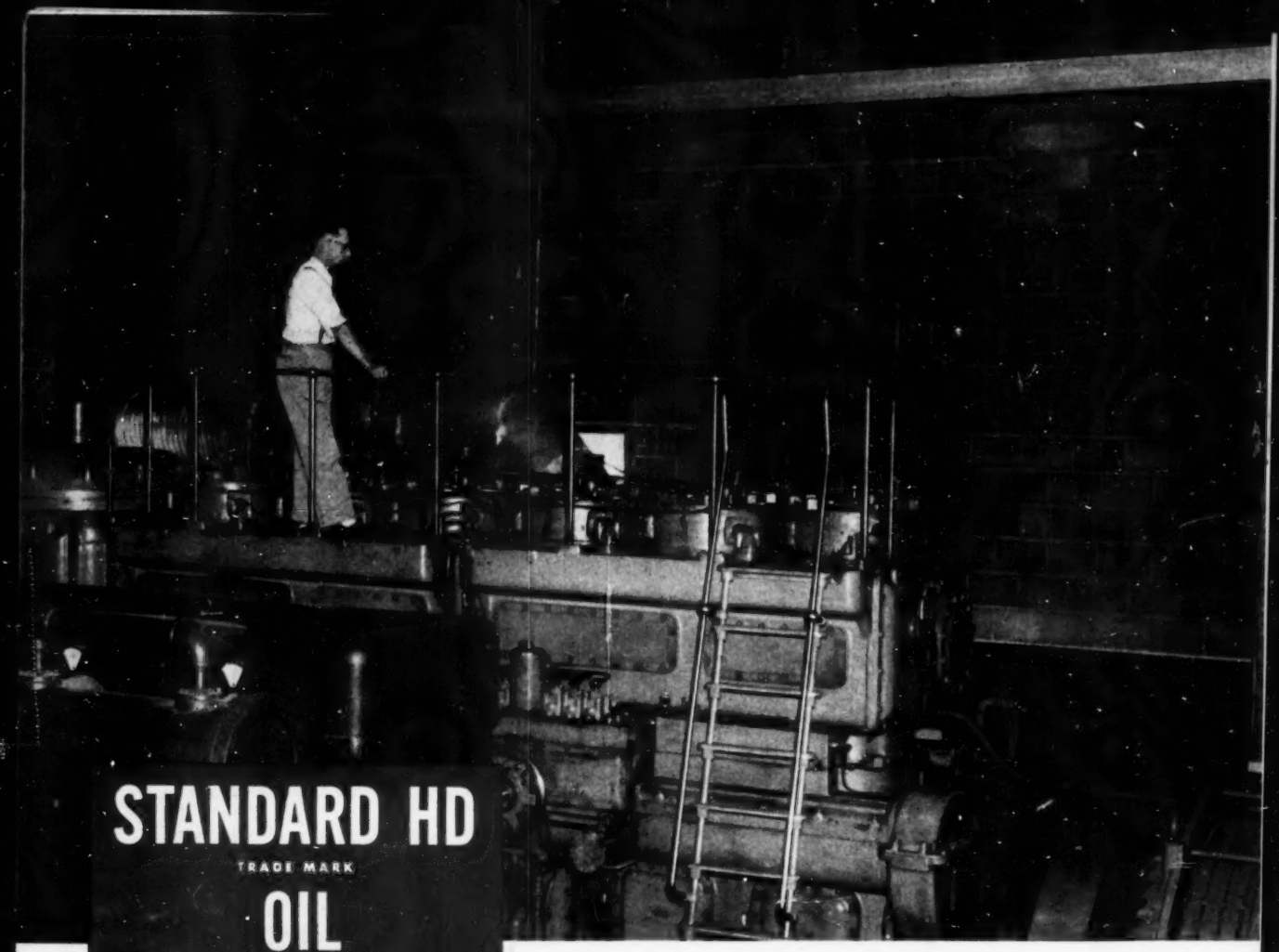

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